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Ethnobotanical heritage of Ban Nongtae Community Forest, Ban Dan District, Buri Ram Province, Thailand

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Abstract. *Saensouk P, Saensouk S, Boonma T, Rakarcha S, Setyawan AD, Chanthavongsa K, Jitpromma T. 2025. Ethnobotanical heritage of Ban Nongtae Community Forest, Ban Dan District, Buri Ram Province, Thailand. Asian J Ethnobiol 8: 182-191.* This study explores plant diversity and ethnobotanical uses in the Ban Nongtae Community Forest, Buri Ram Province, Thailand. Field surveys and interviews were conducted with 30 local informants to document species and their uses. The data were analyzed using descriptive statistics to summarize use categories, species frequency, and life forms, providing insight into community reliance and conservation priorities. A total of 33 plant species from 20 families were identified, with Apocynaceae and Fabaceae each of 4 species (12.12%) being the most utilized. The dominant life forms were herbs and shrubs, indicating a vegetation structure sensitive to disturbance. The local community depends on these plants for daily needs, i.e., 18 species are used for medicine, 12 species for food, and others for fuel, fodder, ornamentals, and rituals. Notable species, include *Calotropis gigantea* (L.) W.T.Aiton and *Urceola polymorpha* (Pierre) D.J.Middleton & Livsh. have high use values of 0.40 and 0.37, respectively. Most species, 29 out of 33 species (87.8%) are native and play key roles in maintaining ecosystem resilience. However, unsustainable practices, such as harvesting heartwood, pose risks to plant populations. Conservation efforts should prioritize native species with high use values, promote sustainable harvesting, and integrate traditional knowledge to support long-term biodiversity and ecosystem stability.

Keywords: Buri Ram Province, community forest, ethnobotany, medicinal plants, Thailand, traditional knowledge, use value, utilization

INTRODUCTION

Ethnobotany examines how people use plants in daily life, offering insights into the interactions between cultural practices and natural environments (Salako et al. 2018; Balick and Cox 2020). Local communities often possess rich traditional plant knowledge, accumulated over generations and used for medicinal, nutritional, cultural, and ornamental purposes (El Mekkaoui et al. 2024; Saensouk et al. 2025a, b). In Thailand, especially in rural areas, this knowledge remains closely tied to livelihoods and local customs (Khunweechuay et al. 2022). However, modernization, environmental change, and generational shifts increasingly threaten its survival (Wali et al. 2017; Arjona-García et al. 2021; Dean 2024). As such, documenting ethnobotanical knowledge is essential not only for cultural preservation but also for biodiversity conservation and sustainable development. Ban Nongtae Community Forest in Ban Dan District, Buri Ram Province, Thailand, provides a unique case where local plant use remains integral to everyday life. The forest supports a variety of species used for food, medicine, rituals, construction, and other cultural practices (Mavhura and Mushure 2019). For instance, *Calotropis gigantea* (L.) W.T.Aiton (giant milkweed or crown flower) is used in spiritual ceremonies such as Bai Sri offering and the Bai Sri Su Khwan ritual. The community is ethnically diverse—comprising Thai-Korat, Lao Isan, Thai-Khmer, and Thai-Suay people—each contributing to a collective pool of plant knowledge shaped by long-term interaction with the forest ecosystem. Their practices reflect sustainable and low-impact resource use, often informed by traditional ecological knowledge.

Despite its cultural and ecological importance, this body of knowledge is increasingly at risk. Deforestation, the expansion of modern agriculture, and changes in lifestyle are contributing to the erosion of traditional practices (de Santana et al. 2024). If not documented in time, valuable knowledge may be lost irreversibly (Boonma et al. 2023, 2024). Ethnobotanical research plays a critical role in identifying culturally important species and understanding their contribution to ecosystem services and community well-being (Chekole 2017; Gitima et al. 2025). Furthermore, localized studies can inform conservation efforts that bridge traditional knowledge and scientific approaches (Barmashova and Lazutkina 2020).

Although some national and regional ethnobotanical surveys have been conducted in Thailand, detailed, site-specific studies remain scarce in the northeastern region, particularly in culturally diverse areas like Ban Nongtae. According to Joa et al. (2018) and Saensouk et al. (2025a), localized inventories are vital for understanding how ethnic diversity influences plant use and conservation behavior. Given the multi-ethnic composition of Ban Nongtae and its continued dependence on forest resources, a focused ethnobotanical investigation is both timely and necessary.

Therefore, this study aims to (i) document the plant species used by the Ban Nongtae Community; (ii) examine their uses across categories such as food, medicine, rituals, and others; and (iii) assess their cultural significance to support biodiversity conservation and the preservation of traditional knowledge. This research provides essential baseline data to inform future conservation planning and underscores the importance of integrating local ecological knowledge into sustainable resource management strategies.

MATERIALS AND METHODS

Study area

Ban Nongtae Community Forest is located in Ban Nong Tae, Non Khwang Sub-district, Ban Dan District, Buri Ram Province, Thailand (15°11′33″N, 103°9′16″E), covering an area of approximately 3.2 ha (Figure 1). This forest is dominated by native hardwood species e.g., *Ridsdalea wittii* (Craib) J.T.Pereira and *Ellipanthus tomentosus* Kurz which adapted to the region's seasonal tropical climate. The community collectively conserves and manages the forest, which serves as a vital source of natural resources supporting their livelihoods. These include food, medicinal herbs, fuelwood, animal fodder, and plants used in various cultural and ritual practices.

Procedures

A plant survey was carried out in Ban Nongtae Community Forest from December 2024 to February 2025. The study involved interviews with 2 local experts, 2 traditional healers, 8 elders, and 18 villagers, with total 30 participants providing valuable insights. These interviews covered local plant names, utilization, their medicinal properties (if used as medicinal plants), preparation methods, and the specific plant parts used. The identified plant species were documented by recording their local names, taking photographs, and collecting samples for herbarium preparation. The plant samples were preserved at the Vascular Plant Herbarium, Mahasarakham University (VMSU).

The morphological features of the collected voucher samples were examined under a stereoscopic microscope (Stemi 2000-C, Zeiss, Oberkochen, Germany). Measurements were taken using a ruler and vernier caliper to ensure precise documentation. Species identification was confirmed by comparing the specimens with descriptions and reference materials available through Plants of the World Online (POWO 2025) (https://powo.science.kew.org) and the International Plant Names Index (IPNI) (https://www.ipni.org). We specifically utilized the "First published in" information provided under each scientific name to access original protologue documents for verification. A thorough review of key taxonomic literature and research databases, including Scopus (https://www.scopus.com), Web of Science (https://www.webofscience.com), Google Scholar (https://scholar.google.com), and ResearchGate (https://www.researchgate.net), was also performed. Additionally, comparisons were made with digital images from Kew's Herbarium and Plants of the World Online, as well as with specimens housed at major Thai herbaria, such as BK (Bangkok Herbarium, Department of National Parks, Wildlife and Plant Conservation), BKF (Forest Herbarium, Bangkok), KKU (Khon Kaen University Herbarium), QBG (Queen Sirikit Botanic Garden Herbarium), and VMSU (Vascular Plant Herbarium, Mahasarakham University) to ensure accurate identification.

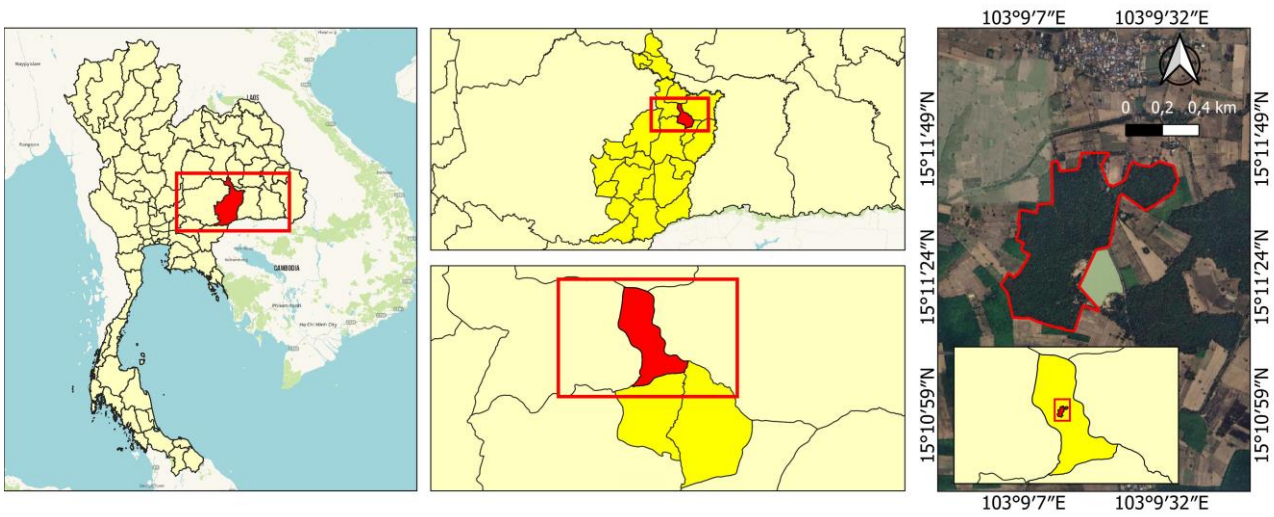

Figure 1. Ban Nongtae Community Forest in Ban Nong Tae, Non Khwang Sub-district, Ban Dan District, Buri Ram Province, Thailand

Ethical considerations: Verbal prior informed consent was obtained from all participants before interviews were conducted. The study followed local ethical standards and was conducted with the approval and participation of community leaders.

Data analysis

Several indices are employed to evaluate the significance and reliability of plant use within communities, such as Use Value (UV) index, Informant Consensus Factor (Fic), and Fidelity Level (FL). These indices are essential tools in identifying key species and plant parts for further research, conservation, and potential application in healthcare and sustainable development.

Use Value (UV) index

The Use Value (UV) index reflects the significance of a plant species within a particular region (Phillips et al. 1994). It is calculated using the following formula:

$$UV = \frac{\sum_i UV_{is}}{n_s}$$

Where: UV index represents the overall use value of the species, UV_{is} is the use value of the species by each informant, and n_s refers to the total number of informants who were interviewed for that species.

Informant consensus factor (F_{ic})

The Informant Consensus Factor (F_{ic}) was used to assess the variability in medicinal plant usage and was computed using the following formula (Heinrich et al. 1998):

$$F_{ic} = \frac{n_{ur} - n_t}{n_{ur} - 1}$$

Where: n_{ur} represents the total number of use reports within a given category, and n_t refers to the number of plant species utilized in that category. The F_{ic} value indicates the degree of consensus among informants about the medicinal plant usage, with higher values showing stronger agreement on the use of specific plants for particular therapeutic purposes.

Fidelity Level (FL)

The Fidelity Level (FL) quantifies the percentage of informants who linked a particular plant species to a specific ailment within the study area. It is calculated using the formula described by Friedman et al. (1986) as follows:

$$FL = \frac{I_p}{I_u} \times 100$$

Where: I_p refers to the number of informants who identified the plant as a remedy for a particular disease, and I_u is the total number of informants who acknowledged the plant's medicinal use for any health issue.

RESULTS AND DISCUSSION

Diversity of plants

A total of 33 plant species, belonging to 20 families, were recorded in Ban Nongtae Community Forest, Ban Nongtae, Ban Dan District, Buri Ram Province, Thailand (Table 1; Figure 2). The most represented families were Apocynaceae and Fabaceae, each with 4 species, followed by Rubiaceae with 3 species. Other notable families included Cucurbitaceae, Euphorbiaceae, Malvaceae, Ochnaceae, and Rutaceae, each with 2 species, contributing significantly to the forest's plant diversity. Families with a single species each included Annonaceae, Boraginaceae, Commelinaceae, Connaraceae, Dipterocarpaceae, Erythroxylaceae, Lecythidaceae, Melastomataceae, Rhamnaceae, Salicaceae, Stemonaceae, and Verbenaceae. Of the recorded species, 29 are native species, accounting for 87.88%, while 4 are introduced species, making up 12.12%.

The distribution of life forms among the plants in Ban Nongtae community forest is as follows: shrubs account for the highest percentage, with 12 species (36.36%), followed by trees with 11 species (33.33%). Climbers make up 6 species (18.18%), while herbs comprise 4 species (12.12%) (Table 1).

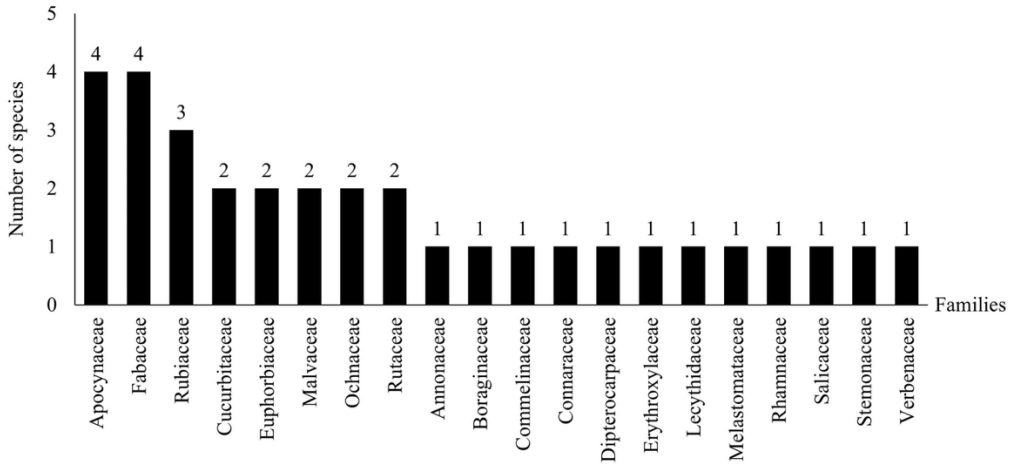

Figure 2. Plant diversity in Ban Nongtae Community Forest, Ban Nongtae, Ban Dan District, Buri Ram Province, Thailand

Table 1. Diversity of plants in Ban Nongtae Community Forest, along with their local name, habits, distribution, utilization, used parts, and specimen voucher

Family	Scientific name	Local name	Habits	Distribution status in Thailand	Utilization	Used parts	UV index	Voucher no.
Annonaceae	*Polyalthia evecta* (Pierre) Finet & Gagnep.	Mak Tong Laeng	Shrub	Native	FD	FT	0.33	TJ351
Apocynaceae	*Calotropis gigantea* (L.) W.T.Aiton	Rak	Shrub	Native	MD, RC	IR, RT	0.40	TJ352
Apocynaceae	*Oxystelma esculentum* (L.fil.) Sm.	Chamuk Pla Lot	Climber	Native	FD	IR, LV	0.20	TJ353
Apocynaceae	*Urceola polymorpha* (Pierre) D.J.Middleton & Livsh.	Som Lom	Climber	Native	FD	FT	0.37	TJ354
Apocynaceae	*Holarrhena pubescens* (Buch.-Ham.) Wall. ex G.Don	Mok Yai	Tree	Native	MD	BA, IR	0.23	TJ355
Boraginaceae	*Heliotropium indicum* L.	Ya Nguangchang	Herb	Introduced	MD	IR, SM	0.20	TJ356
Commelinaceae	*Commelina benghalensis* L.	Phak Plap	Herb	Native	AF	WP	0.13	TJ357
Connaraceae	*Ellipanthus tomentosus* Kurz	Ta Nok Kot	Tree	Native	MD	HW, RT, SM	0.10	TJ358
Cucurbitaceae	*Coccinia grandis* (L.) Voigt	Tamlueng	Climber	Native	FD	LV	0.23	TJ359
Cucurbitaceae	*Solena amplexicaulis* (Lam.) Gandhi	Bung Len	Climber	Native	MD	LV	0.13	TJ360
Dipterocarpaceae	*Dipterocarpus intricatus* Dyer	Sa Baeng	Tree	Native	AP, FL, RC	FT, SM	0.30	TJ361
Erythroxylaceae	*Erythroxylum cambodianum* Pierre	Ma Hok Ton	Shrub	Native	MD	RT	0.20	TJ362
Euphorbiaceae	*Suregada multiflora* (A.Juss.) Baill.	Mot	Tree	Native	MD	BA, RT	0.17	TJ363
Euphorbiaceae	*Trigonostemon reidioides* (Kurz) Craib	Lot Thanong	Shrub	Native	MD	RT	0.13	TJ364
Fabaceae	*Bauhinia saccocalyx* Pierre	Som Siao	Shrub	Native	FD, ON	LV, WP	0.27	TJ365
Fabaceae	*Leucaena leucocephala* (Lam.) de Wit	Krathin	Shrub	Introduced	AF, FL	LV, SM	0.30	TJ366
Fabaceae	*Senna garrettiana* (Craib) H.S.Irwin & Barneby	Khilek San	Tree	Native	FD, FL, ON	LV, SW, WP	0.27	TJ367
Fabaceae	*Senna occidentalis* (L.) Link	Len Khet	Shrub	Introduced	MD	LV, RT	0.23	TJ368
Lecythidaceae	*Careya arborea* Roxb.	Kra Don	Tree	Native	FD	LV	0.20	TJ369
Malvaceae	*Bombax anceps* Pierre	Ngio Pa	Tree	Native	AP, FL	FT, SM	0.17	TJ370
Malvaceae	*Helicteres hirsuta* Lour.	Khithao	Shrub	Native	MD	FT, HW	0.07	TJ371
Melastomataceae	*Memecylon scutellatum* (Lour.) Hook. & Arn.	Mueat Ae	Shrub	Native	MD	RT, SM	0.10	TJ372
Ochnaceae	*Campylospermum serratum* (Gaertn.) Bittrich & M.C.E.Amaral	Khaeo Ei Khun	Shrub	Native	MD	HW, RT, SM	0.17	TJ373
Ochnaceae	*Ochna integerrima* (Lour.) Merr.	Chang Nao	Tree	Native	MD	RT	0.13	TJ374
Rhamnaceae	*Ziziphus cambodiana* Pierre	Nam Phlong	Shrub	Native	FD	FT	0.20	TJ375
Rubiaceae	*Gardenia sootepensis* Hutch.	Kham Mok Luang	Tree	Native	ON	WP	0.27	TJ376
Rubiaceae	*Paederia linearis* Hook.f.	Khruea Tot Ma	Climber	Native	FD	LV	0.23	TJ377
Rubiaceae	*Ridsdalea wittii* (Craib) J.T.Pereira	Mak Mo	Tree	Native	FD, MD	FT, HW, RT	0.20	TJ378
Rutaceae	*Clausena excavata* Burm.f.	Sa Mat	Shrub	Native	MD	IR, LV, RT	0.17	TJ379
Rutaceae	*Clausena harmandiana* (Pierre) Pierre ex Guill.	Song Fa	Herb	Native	MD	RT	0.13	TJ380
Salicaceae	*Flacourtia indica* (Burm.f.) Merr.	Mak Ben	Tree	Native	FD	FT	0.20	TJ381
Stemonaceae	*Stemona tuberosa* Lour.	Nhon Tai Yak	Climber	Native	MD	RT	0.20	TJ382
Verbenaceae	*Stachytarpheta jamaicensis* (L.) Vahl	Phan Ngu Khiao	Herb	Introduced	AF, MD	WP	0.13	TJ383

Note: Utilization: AF: animal fodder, AP: appliances, FD: food, FL: fuel, MP: medicine, ON: ornamental purpose, RC: ritual and ceremonies. Used parts = BA: bark, FT: fruits, HW: heartwood, IR: inflorescences, LV: leaves, RT: roots, SM: stem, WP: whole plant

Utilization of plants

The Use Value (UV) index of various plant species in the study area was calculated to assess their significance to local communities. The UV index ranges from 0.07 to 0.40 (Table 1), reflecting varying levels of importance based on the number of informants and their reported uses of the species. The species with the highest UV index was *C. gigantea* (UV = 0.40), indicating its considerable importance in the region, followed by *Urceola polymorpha* (Pierre) D.J.Middleton & Livsh. (UV = 0.37) and *Polyalthia evecta* (Pierre) Finet & Gagnep. (UV = 0.33). A substantial portion of the species had UV index ranging from 0.20 to 0.30, suggesting moderate usage and significance within the local community. These species included *Dipterocarpus intricatus* Dyer, *Leucaena leucocephala* (Lam.) de Wit, and *Bauhinia saccocalyx* Pierre (UV = 0.27), among others. Several species showed lower UV values, indicating limited or specialized use, such as *Helicteres hirsuta* Lour. (UV = 0.07), *Memecylon scutellatum* (Lour.) Hook. & Arn. (UV = 0.10), and *E. tomentosus* (UV = 0.10).

The plant species utilization in the research site demonstrates a wide variety of applications across different categories (Figure 3). The largest number of species (18 species) was recorded for medicinal purposes, highlighting the importance of plants in local healthcare. Twelve species were identified for food use, while four species were used for fuel. Additionally, 3 species were utilized for animal fodder and another 3 for ornamental purposes. Two species each were reported for use in appliances and in rituals and ceremonies.

Animal fodder

The plants used as animal fodder in the community include *Commelina benghalensis* L., *L. leucocephala,* and *Stachytarpheta jamaicensis* (L.) Vahl (Table 1). These species provide essential nutrients for livestock, supporting local agricultural practices. *Leucaena leucocephala* is especially valued for its protein-rich leaves, while *C. benghalensis* and *S. jamaicensis* are commonly used for their availability and nutritional benefits. These plants play a vital role in feeding animals and sustaining the community's farming systems.

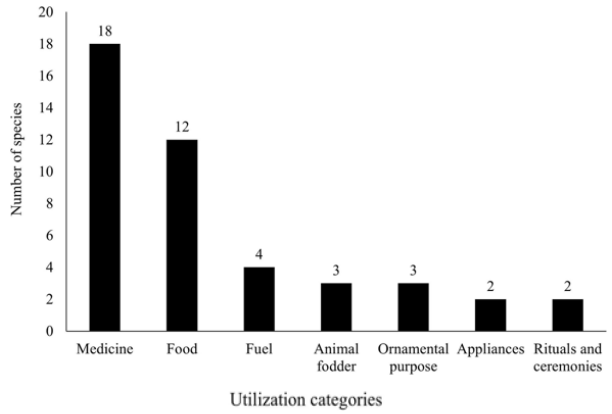

Figure 3. Utilization categories of plants used by villagers in Ban Nongtae Community Forest, Ban Dan District, Buri Ram Province, Thailand

Appliances

The following plants are utilized in the production of electrical appliances, with various parts of each plant serving distinct functions (Table 1). Different parts of *D. intricatus* are used for various purposes. The trunk, known for its durability and strength, is particularly valued in construction, furniture making, and the production of household appliances. Meanwhile, the fruits of the *Bombax anceps* Pierre, which contain natural fibers, are commonly used to produce pillows and mattresses. These plants contribute significantly to the creation of functional products and tools, with each part being processed into materials that are suitable for industrial use. Through this versatile application, they play an important role in meeting the demands of modern production and everyday living.

Food

A variety of plant species are used primarily as food sources by the community, each providing different parts of the plant for consumption (Table 1). *Polyalthia evecta* is utilized for its fruits, which the local people commonly eat. Similarly, *Ziziphus cambodiana* Pierre, and *R. wittii* are valued for their fruits, which form an important part of the local diet. *Flacourtia indica* (Burm.f.) Merr. also provides fruits that are consumed as food. Some plants offer multiple edible parts, such as *U. polymorpha* provides both fruits and leaves, which are used in local cuisine. *Leucaena leucocephala* is another plant that contributes both fruits and leaves, making it a versatile food source. *Oxystelma esculentum* (L.f.) Sm. offers its inflorescences and leaves for consumption, reflecting its role as a key food resource. Several plants are used specifically for their leaves, such as *Coccinia grandis* (L.) Voigt which is known for its leaves, which are incorporated into local dishes. *Bauhinia saccocalyx* and *Senna garrettiana* (Craib) H.S.Irwin & Barneby are also used for their leaves in various culinary preparations. *Careya arborea* Roxb. provides leaves that are eaten in the community. Finally, *Paederia linearis* Hook.f. is used for its roots, which are an important part of the diet in the region.

The plant species used by the community exhibit a variety of edible parts, which contribute to the local diet. Fruits and leaves are the most commonly utilized parts, with each accounting for 33.33% of the species, highlighting their central role in the community's food sources. A smaller proportion of species provide both fruits and leaves, making up 16.67% of the total, showcasing the versatility of these plants. Additionally, 8.33% of the species are valued for a combination of inflorescences and leaves, while the remaining 8.33% provide roots, which are also an important food resource.

Fuel

Several species with specific parts of each being harvested for energy production (Table 1). *Dipterocarpus intricatus* is primarily tapped for its latex, which serves as a valuable source of fuel. *Leucaena leucocephala*, commonly known for its fast growth and nitrogen-fixing properties, utilizes its stems as a significant fuel source. Similarly, *S. garrettiana* is another plant where the stem is the primary

part used for fuel. Lastly, *B. anceps* also relies on its stems for fuel production. These plants, with their diverse parts being used for fuel, contribute to sustainable energy sources, particularly in regions where traditional fuelwood is scarce or difficult to obtain.

Medicine

A total of 18 species are recognized for their medicinal properties, with various parts of each plant being utilized for therapeutic purposes (Tables 1 and 3). They are employed in the treatment of a wide range of conditions, highlighting their significance in local healthcare systems. The use of these plants underscores the importance of preserving traditional medicinal knowledge and ensures the continued relevance of these natural remedies in contemporary health practices.

Ornamental purpose

Bauhinia saccocalyx, *S. garrettiana*, and *Gardenia sootepensis* Hutch. are plants commonly used for ornamental purposes (Table 1). *Bauhinia saccocalyx* is admired for its striking flowers and is often grown for its aesthetic appeal in gardens and landscapes. Similarly, *S. garrettiana* is valued for its vibrant appearance and decorative qualities, making it a popular choice for ornamental planting. *Gardenia sootepensis* is also cultivated for its beautiful flowers and pleasant fragrance, enhancing the visual and sensory appeal of outdoor spaces. These plants are not only appreciated for their beauty but also contribute to the decorative and aesthetic value of the environment.

Rituals and ceremonies

Calotropis gigantea and *D. intricatus* are plants commonly used in rituals and ceremonies (Table 1). *Calotropis gigantea* holds a significant place in cultural practices, particularly in religious and spiritual ceremonies. Its flowers are often used to create *Bai Sri* (a rice offering) for worshiping Buddha, as well as in other ceremonies like the Bai Sri Su Khwan (wrist-binding ceremony). Similarly, *D. intricatus* plays a valued role in rituals, especially during the Bun Pha Wet ceremony. Its flowers are used as decorations in the ceremony's sacred space. These plants are not only important for their cultural significance but also serve as symbols of the local community's beliefs and traditions.

Informant consensus factor (F_{ic}) of medicinal plants

The Informant Consensus Factor (F_{ic}) values for medicinal plants used in Ban Nongtae Community Forest illustrate the degree of agreement among informants regarding the therapeutic application of various species (Table 2). The highest F_{ic} values (1.00) were observed in the categories of central nervous system (1 species, 3 use reports) and respiratory system (1 species, 4 use reports), indicating complete consensus among informants in using a single plant species for these ailments. High but slightly lower F_{ic} values were recorded in the categories of musculoskeletal and joint diseases (F_{ic} = 0.82; 3 species, 12 use reports) and drugs used in poisoning and toxicology (F_{ic} = 0.80; 2 species, 6 use reports), suggesting relatively strong agreement with some diversity in plant use. The infections category showed a F_{ic} of 0.74 (10 species, 36 use reports), reflecting moderate consensus likely due to the wide range of plant species used for treating various infections. Lower F_{ic} values were found in categories with greater diversity in plant usage. These include the gastrointestinal system (F_{ic} = 0.67; 6 species, 16 use reports), nutrition and blood (F_{ic} = 0.67; 3 species, 7 use reports), ear, nose, oropharynx, and oral cavity (F_{ic} = 0.64; 5 species, 12 use reports), obstetrics, gynecology, and urinary-tract disorders (F_{ic} = 0.64; 5 species, 12 use reports), and skin disorders (F_{ic} = 0.63; 4 species, 9 use reports). These lower values suggest more varied knowledge and preferences among informants, with multiple plant species used to address the same health concerns. The F_{ic} values indicate that consensus is strongest when a single plant is widely recognized for a particular ailment, while more diverse use of multiple species tends to lower agreement levels, reflecting the breadth of traditional medicinal knowledge in the community.

Fidelity level (FL) of medicinal plants

A total of 18 species were identified for medicinal use in the study area (Tables 1 and 3). Among them, *C. gigantea* demonstrated the highest Fidelity Level (FL) of 40, highlighting its significant role in treating symptoms of cough, cold, asthma, and fever. *Campylospermum serratum* (Gaertn.) Bittrich & M.C.E.Amaral followed with an FL of 33.33, while *Clausena harmandiana* (Pierre) Pierre ex Guill. had an FL of 60, indicating their moderate to high importance for medicinal purposes, especially for treating various ailments such as aches, pains, and gastrointestinal issues. Several species were particularly notable for their use in treating fever.

Table 2. Informant consensus factor (F_{ic}) of medicinal plants used by villagers of Ban Nongtae Community Forest

Group of ailments	Total number of use reports (n_{ur})	The number of plant species (n_t)	F_{ic}
Central nervous system	3	1	1.00
Respiratory system	4	1	1.00
Musculoskeletal and joint diseases	12	3	0.82
Drugs used in poisoning and toxicology	6	2	0.80
Infections	36	10	0.74
Gastrointestinal system	16	6	0.67
Nutrition and blood	7	3	0.67
Ear, nose, oropharynx, and oral cavity	12	5	0.64
Obstetrics, gynaecology, and urinary-tract disorders	12	5	0.64
Skin	9	4	0.63

Table 3. Fidelity Level (FL) of medicinal plants used by villagers of Ban Nongtae Community Forest

Scientific name	Ip	Iu	FL	Used parts	Preparation	Method of uses	Ailments	Group of ailments
Calotropis gigantea (L.) W.T.Aiton	2	5	40.00	Inflorescence	Dry and boil in water, filter to get only the liquid	Drink	Treat symptoms of cough, cold, and asthma	Ear, nose, oropharynx, and oral cavity
	3	5	60.00	Root	Boil in water, filter to get only the liquid	Drink	Treat fever	Infections
Campylospermum serratum (Gaertn.) Bittrich & M.C.E.Amaral	2	6	33.33	Root	Boil in water, filter to get only the liquid	Drink	Treat diabetes	Nutrition and blood
	3	6	50.00	Stem	Boil in water, filter to get only the liquid	Drink	Treat aches and pains	Musculoskeletal and joint diseases
	1	6	16.67	Heartwood	Boil in water, filter to get only the liquid	Drink	Treat urinary retention	Obstetrics, gynaecology, and urinary-tract disorders
Clausena excavata Burm.f.	5	9	55.56	Root	Boil in water, filter to get only the liquid	Drink	Treat parasitic infections	Infections
	2	9	22.22	Leave	Boil in water, filter to get only the liquid	Drink	Treat fever	Infections
	2	9	22.22	Inflorescence	Boil in water, filter to get only the liquid	Drink	Treat phlegm	Ear, nose, oropharynx, and oral cavity
Clausena harmandiana (Pierre) Pierre ex Guill.	3	5	60.00	Root	Boil in water, filter to get only the liquid	Drink	Treat headaches	Central nervous system
	2	5	40.00	Root	Combine with the root of *Cladogynos orientalis*, boil in water, and filter to obtain only the liquid.	Drink	Treat colic	Gastrointestinal system
Ellipanthus tomentosus Kurz	1	8	12.50	Heartwood	Boil in water, filter to get only the liquid	Drink	Treat stomach pain	Gastrointestinal system
	3	8	37.50	Root	Boil in water, filter to get only the liquid	Drink	Helps nourish the body postpartum	Obstetrics, gynaecology and urinary-tract disorders
	4	8	50.00	Stem	Boil in water, filter to get only the liquid	Drink	Treat asthma	Respiratory system
Erythroxylum cambodianum Pierre	5	5	100.00	Root	Boil in water, filter to get only the liquid	Drink	Treat aches and pains	Musculoskeletal and joint diseases
Helicteres hirsuta Lour.	1	6	16.67	Heartwood	Boil in water, filter to get only the liquid	Drink	Treat itchy skin rashes	Skin
	2	6	33.33	Heartwood	Boil in water, filter to get only the liquid	Drink	Treat symptoms of cough, cold, and asthma	Ear, nose, oropharynx, and oral cavity
	3	6	50.00	Fruit	Boil in water, filter to get only the liquid	Drink	Treat parasitic infections	Infections
Heliotropium indicum L.	2	4	50.00	Stem	Boil in water, filter to get only the liquid	Drink	Treat stomach pain	Gastrointestinal system
	2	4	50.00	Inflorescence	Boil in water, filter to get only the liquid	Drink	Treat menstrual disorders	Obstetrics, gynaecology, and urinary-tract disorders
Holarrhena pubescens (Buch.-Ham.) Wall. ex G.Don	3	9	33.33	Bark	Boil in water, filter to get only the liquid	Drink	Treat phlegm	Ear, nose, oropharynx, and oral cavity
	2	9	22.22	Bark	Boil in water, filter to get only the liquid	Drink	Treat diabetes	Nutrition and blood
	4	9	44.44	Inflorescence	Boil in water, filter to get only the liquid	Drink	Treat parasitic infections	Infections
Memecylon scutellatum (Lour.) Hook. & Arn.	5	7	71.43	Root	Boil in water, filter to get only the liquid	Drink	Treat stomach diseases	Gastrointestinal system
	2	7	28.57	Stem	Boil in water, filter to get only the liquid	Drink	Diuretics	Obstetrics, gynaecology, and urinary-tract disorders
Ochna integerrima (Lour.) Merr.	3	8	37.50	Root	Boil in water, filter to get only the liquid	Drink	Treat diabetes	Nutrition and blood
	5	8	62.50	Root	Boil in water, filter to get only the liquid	Drink	Treat parasitic infections	Infections

Ridsdalea wittii (Craib) J.T.Pereira	3	7	42.86	Root	Boil in water, filter to get only the liquid	Drink	Treat fever	Infections
	4	7	57.14	Heartwood	Boil in water, filter to get only the liquid	Drink	Diuretics	Obstetrics, gynaecology, and urinary-tract disorders
Senna occidentalis (L.) Link	4	6	66.67	Root	Boil in water, filter to get only the liquid	Drink	Detoxify poisons and poisonous mushrooms	Drugs used in poisoning and toxicology
	2	6	33.33	Leave	Boil in water, filter to get only the liquid	Drink	Treat fever	Infections
Solena amplexicaulis (Lam.) Gandhi	3	6	50.00	Leave	Pound until fine, mix with a little water, then squeeze out the juice and apply to the affected area.	Apply to skin	Treat itchy skin	Skin
	3	6	50.00	Leave	Eat fresh		Treat symptoms of indigestion and stomach bloating	Gastrointestinal system
Stachytarpheta jamaicensis (L.) Vahl	5	10	50.00	Whole plant	Boil in water, filter to get only the liquid	Drink	Treat fever	Infections
	2	10	20.00	Whole plant	Boil in water, filter to get only the liquid	Drink	Treat parasitic infections	Infections
	3	10	30.00	Whole plant	Boil in water, filter to get only the liquid	Drink	Treat phlegm	Ear, nose, oropharynx and oral cavity
Stemona tuberosa Lour.	3	4	75.00	Root	Boil in water, filter to get only the liquid	Drink	Treat skin disease	Skin
	1	4	25.00	Root	Boil in water, filter to get only the liquid	Drink	Treat parasitic infections	Infections
Suregada multiflora (A.Juss.) Baill.	2	5	40.00	Root	Boil in water, filter to get only the liquid	Drink	Treat skin disease	Skin
	3	5	60.00	Bark	Boil in water, filter to get only the liquid	Drink	Laxative	Gastrointestinal system
Trigonostemon reidioides (Kurz) Craib	2	7	28.57	Root	Grind with the water	Drink	Detoxify poisons and poisonous mushrooms	Drugs used in poisoning and toxicology
	4	7	57.14	Root	Grind with the water	Apply to skin	Treat sprains	Musculoskeletal and joint diseases
	1	7	14.29	Root	Boil in water, filter to get only the liquid	Drink	Treat tuberculosis	Infections

Clausena excavata Burm.f. (FL = 22.22) and *R. wittii* (FL = 42.86) were commonly used, particularly for treating fever and parasitic infections. *Senna occidentalis* (L.) Link (FL = 66.67) also had a high FL, underscoring its common use in treating fever and poisons. *Erythroxylum cambodianum* Pierre (FL = 100) emerged as one of the most valued species, particularly for treating aches and pains, reflecting its high Fidelity Level and specific use in musculoskeletal and joint diseases. On the other hand, species such as *H. hirsuta* (FL = 16.67) and *Solena amplexicaulis* (Lam.) Gandhi (FL = 50) were commonly used for treating skin-related ailments, such as itchy rashes and skin diseases. Several species also demonstrated notable use in addressing gastrointestinal issues. *M. scutellatum* (FL = 71.43) and *Heliotropium indicum* L. (FL = 50) were frequently used to treat stomach-related ailments like pain, indigestion, and bloating. *Suregada multiflora* (A.Juss.) Baill. (FL = 60) was also used for constipation and other digestive issues. For musculoskeletal and joint diseases, species like *C. serratum* (FL = 50) and *Trigonostemon reidioides* (Kurz) Craib (FL = 57.14) played significant roles. Notably, *C. serratum* was also reported for its effectiveness in treating diabetes, demonstrating its wide-ranging medicinal applications. In treating parasitic infections, species such as *S. jamaicensis* (FL = 50) and *Holarrhena pubescens* (Buch.-Ham.) Wall. ex G.Don (FL = 44.44) were prominently used, highlighting their essential role in local healthcare practices.

Overall, the Fidelity Level (FL) of the species in the study demonstrates the diverse and critical role these plants play in the health care practices of local communities. Some species, such as *E. cambodianum* and *S. occidentalis*, exhibit multiple medicinal applications across various groups of ailments.

Discussion

This study documented 33 plant species across 20 families in Ban Nongtae Community Forest, with Apocynaceae, Fabaceae, and Rubiaceae as the most prominent families. These species serve diverse purposes—including food, medicine, rituals, and construction—reflecting the multifunctional use of plant resources by the local community. Compared to ethnobotanical studies in nearby areas, species diversity here is lower. For example, Appamaraka et al. (2023) recorded 44 species from 28 families in Don Pu Ta Forest, Sakon Nakhon Province, and

Saensouk et al. (2025c) documented 109 species from 48 families in Lao Isan, Maha Sarakham Province. Niamngon et al. (2024) reported 317 species across 89 families in Pho Chai District, Roi Et Province, possibly reflecting more intensive agricultural practices and cultural traditions. Despite fewer species, Ban Nongtae displays notable diversity in use categories beyond medicine, such as food, ritual, and construction, underscoring the forest's cultural importance. In contrast, other areas emphasize medicinal or economic plants depending on their ecological and socio-economic contexts (Panyadee et al. 2022). While threats from urbanization endanger traditional knowledge elsewhere (Niamngon et al. 2024), Ban Nongtae's smaller community still preserves deep ethnobotanical knowledge, illustrating the vital role of community forests as refuges of biocultural heritage.

Life form strongly influences vulnerability to overharvesting. Shrubs (36.36%) and trees (33.33%) dominate the species recorded, followed by climbers and herbs. Considering life form alongside the Use Value (UV) and harvested plant parts offers insight into conservation risks. Species harvested primarily for fruits or leaves generally face lower risk, as these parts can be collected sustainably. Conversely, harvesting roots, bark, or heartwood often damages or kills plants, elevating vulnerability. Trees and woody climbers, which grow and regenerate slowly, are particularly at risk when harvested for such parts. Herbs and fast-growing shrubs, usually collected for leaves or fruits, present lower risks. The identification of high-risk species highlights the urgent need for conservation measures such as promoting non-lethal harvesting, cultivation, and community education to sustain biodiversity and traditional use (Crausbay and Martin 2016). Although less represented, climbers and herbs contribute to forest structure, nutrient cycling, and habitat complexity (Götmark et al. 2016).

The predominance of native species (87.88%) indicates a healthy, stable forest ecosystem well adapted to local conditions (Shelef et al. 2017). The presence of introduced species (12.12%) reflects human influence and potential ecological disruption through competition or habitat alteration (Rodewald and Arcese 2016). Monitoring these introduced taxa is important to maintain ecological balance.

The Use Value (UV) index reveals the relative importance of species to the community. *C. gigantea* emerged as particularly significant, alongside species such as *U. polymorpha* and *P. evecta*, which play vital roles in daily life. The range of UV values reflects differing degrees of utility, from multifunctional species to those with more specialized uses (Darmastuti et al. 2024). The wide variety of plant uses—medicinal, nutritional, ritual, construction, and more—demonstrates the forest's integral role in sustaining livelihoods and cultural practices (Mapaya et al. 2022).

Medicinal plants hold a prominent place, with 18 species used for healthcare. High Informant Consensus Factor (F_{ic}) values for conditions such as central nervous system and respiratory ailments suggest strong agreement on effective treatments (Ambu et al. 2020). Moderate F_{ic} values in categories like musculoskeletal and gastrointestinal issues indicate diverse plant usage, while lower values in more complex health categories reflect variable practices. Species like *C. gigantea*, *C. harmandiana*, and *S. occidentalis* serve key medicinal roles, while others such as *E. cambodianum* and *M. scutellatum* are important for specific ailments. Multifunctional species such as *C. serratum* underscore the diversity of traditional medicine. These findings highlight the need to conserve medicinal plants for both community health and potential drug discovery.

Beyond medicine, plants support food security (e.g., *P. evecta*, *Z. cambodiana*), animal fodder (*L. leucocephala*, *C. benghalensis*), and material culture (*D. intricatus*, *B. anceps*), illustrating a broad spectrum of community reliance (Hidayat 2017; Duguma 2020; Radha et al. 2022). Such multifunctionality strengthens the socio-economic resilience of the community.

In conclusion, the Ban Nongtae Community Forest in Buri Ram Province serves as a vital repository of plant diversity and traditional ecological knowledge. Although species richness is modest compared to nearby regions, the multifunctional use of plants for medicine, food, rituals, and construction reflects the community's deep ecological relationships. Most species are native and harvested sustainably, but several high-use taxa, particularly trees and woody climbers valued for their roots or bark, face elevated conservation risks. Three key insights emerge from the study. First, even small-scale community forests can support a rich mosaic of culturally significant plant uses. Second, integrating data on life form, use value, and plant parts offers a practical framework to assess conservation vulnerability. Third, strong informant consensus around certain medicinal species reflects the resilience of local knowledge systems. To ensure long-term sustainability, conservation efforts should prioritize the cultivation of high-risk species, promote non-destructive harvesting practices, and strengthen knowledge transmission within the community. Protecting such forests is essential not only for biodiversity conservation but also for maintaining the cultural and ecological resilience of local livelihoods.

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