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Ethnobotanical Study of Medicinal Plants among Lao, Tai, and Khmu Ethnic Groups in Pakkading District, Bolikhamxai Province, Laos

Phetlasy Souladeth [*1], Anousone Sengthong [2], Deuanta Kongxaisavath [3], Khammon Soutakone[4] and Kajonesuk Phengmala [5]

Department of Forest Management, Faculty of Forest Science, National University of Laos. Dongdok campus, Xaythany district, Vientiane capital, Lao PDR

***Correspondence:** Phetlasy Souladeth , Department of Forest Management, Faculty of Forest Science, National University of Laos. Dongdok campus, Xaythany district, Vientiane capital, Lao PDR,
Tel: 020 22421002,
E-mail: p.souladeth@nuol.edu.la

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Abstract

This research investigated the ethnobotanical knowledge of medicinal plant use among three ethnic groups (Lao, Tai, and Khmu) in Pakkading District, Bolikhamxai Province, central Laos. A total of 111 medicinal plant species were documented, representing 97 genera and 55 families. Quantitative analysis was conducted using Use Value (UV) and Informant Agreement Ratio (IAR). Cluster analysis based on Jaccard's Similarity Index (JI) was applied to assess the similarity of medicinal plant use among the three groups. The most important species were *Curcuma longa* L. (UV = 1) for the Lao; *Chromolaena odorata* (L.) R. M. King & H. Rob. and *Curcuma longa* (UV = 0.98) for the Tai; and *Phyllanthus emblica* L. (UV = 0.95) for the Khmu. According to the IAR, all three groups showed high consensus values, particularly the Lao, indicating strong agreement on the use of plants for specific ailments. These findings suggest that certain species are widely recognized and consistently used for traditional treatments. Comparison of medicinal plant use showed the highest similarity between the Lao and Tai, as reflected in a high Jaccard Index, whereas the Khmu exhibited the greatest difference relative to the other two groups. The extensive documentation of medicinal plants and the identification of culturally and historically significant species highlight the importance of forest conservation for safeguarding both the livelihoods and ethnobotanical knowledge of local and indigenous communities in Bolikhamxai Province. This study examined the medicinal plant knowledge of the Lao, Tai, and Khmu ethnic groups in Pakkading District, Bolikhamxai Province, central Laos. A total of 111 species from 55 families were recorded. Quantitative analyses (UV, IAR, and JI) revealed that *Curcuma longa*, *Chromolaena odorata*, and *Phyllanthus emblica* were the most important species. All groups showed high agreement in plant use, with the Lao and Tai sharing the greatest similarity, while the Khmu differed more. The findings highlight the rich traditional knowledge and the importance of conserving forests to protect local culture and livelihoods.

Keywords: Communities, ethnobotany, medicinal plants, plant utilization, traditional knowledge

1. Introduction

Medicinal plants play a vital role in human life, representing traditional knowledge that has supported societies from ancient times to the present. The close relationship between humans and plants is evident at global, national, and local levels. UNESCO (2003) recognizes this connection and has promoted initiatives to safeguard and strengthen indigenous knowledge. In Laos, traditional knowledge of medicinal plants has a long history. Vidal (1958) first documented the diversity of

plant species and their local names across three Lao ethnic groups, followed by Pottier (1971), who reported on the use of medicinal plants in the country.

Laos is characterized by abundant water resources from the Mekong River (The World Bank, 2014) and exceptional linguistic diversity within the Indo-Chinese region. The Lao are the largest ethnic group, representing about 54.6% of the population and found across all provinces. They primarily speak the Lao-Tai language and maintain cultural traditions rooted in Buddhism. The Tai ethnic group, historically related to the Lao, represents about 3.8% of the national population and is concentrated in the northern provinces, including Bolikhamxay. The Khmu, an indigenous group living mainly in the north and extending to Khammouan province, make up approximately 10.9% of the population (Ministry of Planning and Investment, Lao Statistics Bureau, 2015).

Bolikhamxai Province, located in central Laos, it is notable for its cultural diversity, particularly in traditional medicinal plant use. Knowledge of medicinal plants has been preserved and transmitted orally across generations. Pakkading District, in particular, is home to Lao, Tai, and Khmu communities, each with distinct cultural traditions and deep-rooted ethnobotanical knowledge.

The knowledge of medicinal plant cultivation among ethnic groups in Bolikhamxai Province, remains incomplete, particularly regarding the comparative use, cultivation practices, cultural significance, and diversity of medicinal plants. Although some studies have documented the Lao, Tai, and Khmu ethnic groups, there is still a lack of in-depth information on household-level cultivation, seasonal use, and economically or medicinally important species. This study focuses on the Lao, Tai, and Khmu groups, which have relatively large populations and are accessible for fieldwork, while also representing distinct cultural, linguistic, and ecological practices suitable for comparative ethnobotanical research. Limiting the study to these three groups reflects constraints in time and resources, whereas smaller or more dispersed ethnic groups are difficult to sample systematically, which could reduce the clarity and reliability of the findings.

This study investigates the diversity of medicinal plant use among the Lao, Tai, and Khmu in Pakkading District. Specifically, it examines methods of preparation and usage within each group and compares similarities and differences in species use, with the aim of contributing to the preservation of indigenous knowledge.

2. Materials and Methods

2.1 Population and sample group

This study was conducted in three villages of Pakkading District, Bolikhamxai Province, representing Lao (Na Kheua Nai), Tai (Phon Cha Lern), and Khmu (Na Phong) communities. Na Kheua Nai, at 160 m elevation, has 105 households and 612 inhabitants; Phon Cha Lern, located in town at the same elevation, is the largest with 1,032 households and 6,124 inhabitants; and Na Phong, at 200 m, comprises 199 households and 994 residents. While Buddhism is practiced across all groups, the Tai and Khmu also follow animistic traditions. A total of 120 informants (40 per group) were randomly selected, spanning ages 20 years old to over 60 years old, with both men and women represented. This balanced distribution ensured the inclusion of diverse knowledge holders and strengthened the reliability of the ethnobotanical data.

2.2 Data collection tools

All the data were collected through semi-structured interviews and focus group discussions, following the approaches described by Phatlamphu et al. (2021) and Phengmala et al. (2023, 2024). Information recorded included common and local plant names, distinguishing morphological characteristics, and details of plant utilization.

2.3 Plant collection and Species identification

Plant specimens were collected in the field for herbarium preparation, with flowers of selected species preserved in 70% ethanol for morphological examination. Specimens were identified by a taxonomist, confirmed by Souladeth et al. (2025), and cross-verified using the Plants of the World Online (POWO, 2025) database. All voucher specimens were deposited in the Herbarium of the Faculty of Forestry, National University of Laos (FOF).

2.4 Data analysis

The collected data were analyzed using various quantitative ethnobotanical indices, including Use Value (UV), Informant Agreement Ratio (IAR), and Jaccard's Similarity Index (JI).

1) Use Value (UV)

Use Value as an index indicating the importance of this plant at the locality (Phillips et al., 1994).

$$UV = \sum U_i / N$$

U_i is the number of use reports for each plant species and N is the total number of informants.

2) Informant Agreement Ratio (IAR)

The informant Agreement Ratio is an index used to measure acceptance or consensus. Among informants and plant utilization for each symptom group (Trotter & Logan, 1986).

$$IAR = (Nur - Nt) / (Nur - 1)$$

Nur is the number of reports of the specific use of plant species in each syndrome and Nt is the number of plant species used in each syndrome.

3) Jaccard's Similarity Index (JI)

Jaccard's Similarity Index was calculated to compare the medicinal plants use by three ethnic group as follows: use by Lao, Tai and Khmu. This will help to focus on differences in plant utilization between the three ethnic groups similarities analyzed with UPGMA cluster analysis (Hammer et al., 2001).

$$JI = c / (a + b + c)$$

When a is the number of medicinal plants used by Lao is a, b is use by Tai and c is the number of same species that uses by Lao and Tai. And this can be calculated in pairs of ethnic groups.

3. Results

3.1 Diversity of Medicinal Plants among Three Ethnic Groups

A total of 111 medicinal plant species, belonging to 97 genera and 55 families, were documented among the Lao, Tai, and Khmu ethnic groups (Table 1, Figure 1). The family with the highest number of species used was Zingiberaceae (11 species), followed by Fabaceae (9 species), Phyllanthaceae (6 species), and Asteraceae, Myrtaceae, and Sapindaceae (4 species each). The remaining families were represented by three or fewer species (Table 1).

Among the Lao, 64 species were recorded, distributed across 54 genera and 36 families. Zingiberaceae had the highest representation (5 species), followed by Fabaceae and Asteraceae (4 species each). The Tai reported 42 species from 37 genera and 26 families, with Zingiberaceae again most represented (5 species), followed by Fabaceae (4 species). The Khmu documented 62 species from 54 genera and 32 families, with Zingiberaceae contributing the highest number (8 species), followed by Fabaceae (6 species).

Use value (UV) analysis highlighted culturally important species for each group. Among the Lao, *Curcuma longa* had the highest UV (1.00), followed by *Phyllanthus emblica* (0.95); *Blumea balsamifera*, *Chromolaena odorata*, *Alpinia galanga*, and *Zingiber officinale* (0.93); *Tiliacora triandra* (0.88); *Cucumis sativus* and *Kaempferia parviflora* (0.85); and *Hymenocallis littoralis* (0.78) (Table 2). In the Tai, the highest UV values were recorded for *Chromolaena odorata* and *Curcuma longa* (0.98), followed by *Blumea balsamifera* (0.93); *Zingiber officinale* (0.88); *Morinda citrifolia* (0.75); *Phyllanthus emblica* (0.73); *Borassus flabellifer* and *Zingiber montanum* (0.70); *Hymenocallis littoralis* (0.68); and *Cucumis sativus* (0.63) (Table 2). For the Khmu, the most valued species was *Phyllanthus emblica* (0.95), followed by *Alocasia macrorrhizos* and *Curcuma longa* (0.93); *Lagerstroemia tomentosa* (0.88); *Zingiber officinale* (0.85); *Lagerstroemia calyculata* and *Tiliacora triandra* (0.75); *Saraca declinate* and *Careya arborea* (0.73); and *Aglaonema modestum* (0.70) (Table 1).

3.2 Preparation and Use of Medicinal Plants

Preparation methods and plant parts used

Across the three ethnic groups, medicinal plants were processed using nine preparation methods: decoction, cooking, crushing, burning, infusion, fresh use, chewing, grinding, and powdering. Plant parts utilized included nine categories: leaves, whole plant, root, stem, bark, fruit, seeds, rhizome, and flower.

- **Lao:** The most common preparation method was decoction (37%), followed by fresh use (34%), cooking (18%), crushing (11%), infusion (6%), chewing (5%), and both burning and grinding (3% each). The most frequently used plant part was leaves (31%), followed by fruit (23%), bark (14%), root and stem (13% each), rhizome (8%), whole plant (6%), flowers (5%), and seeds (2%).
- **Tai:** Fresh use was most common (36%), followed by cooking (26%), decoction (19%), crushing (12%), infusion (7%), and both burning and grinding (2% each). Leaves were the dominant plant part (36%), followed by fruit (29%), bark (14%), rhizome (12%), root (10%), stem (7%), and flowers (5%), while whole plant and seeds were least used (2% each).

- **Khmu:** Decoction dominated (50%), followed by fresh use (31%), cooking (15%), crushing, burning, and infusion (3% each), and powdering (2%). The most used plant part was leaves (27%), followed by fruit (21%), stem (18%), whole plant (13%), bark (11%), root (8%), flowers (3%), and rhizome (2%).

Informant Agreement Ratio (IAR) Medicinal plants were used to treat ailments classified into 17 categories, based on the National Essential Medicines List (Natural Drug Information, 2013).

- **Lao:** Plants were used for 15 categories of ailments, with the greatest diversity targeting gastrointestinal disorders (IAR = 0.94; 17 species), including *Dillenia obovata*, *Ziziphus jujuba*, *Careya arborea*, *Barringtonia acutangula*, *Adinobotrys atropurpureus*, *Cratoxylum formosum*, *Lagerstroemia tomentosa*, *Syzygium gratum*, *Curcuma longa*, *Chromolaena odorata*, *Olax scandens*, *Zingiber montanum*, *Z. officinale*, *Benincasa hispida*, *Cassia fistula*, *Nephelium hypoleucum*, and *Schleichera oleosa*.
- **Tai:** Plants were applied in 12 ailment categories, again with the highest diversity for gastrointestinal disorders (IAR = 0.94; 13 species), including *Spondias pinnata*, *Cajanus cajan*, *Ziziphus jujuba*, *Heliciopsis terminalis*, *Alpinia galanga*, *Lagerstroemia speciosa*, *Syzygium gratum*, *Curcuma longa*, *Zingiber montanum*, *Benincasa hispida*, *Tinospora crispa*, *Nephelium hypoleucum*, and *Schleichera oleosa*.
- **Khmu:** Medicinal plants were used for 16 ailment categories, with the highest diversity also for gastrointestinal disorders (IAR = 0.95; 19 species), including *Dillenia ovata*, *Cajanus cajan*, *Careya arborea*, *Heliciopsis terminalis*, *Alpinia calcarata*, *Wurfbainia uliginosa*, *W. villosa*, *W. villosa* var. *xanthioides*, *Amomum* sp., *Adinobotrys atropurpureus*, *Isodon lophanthoides*, *Lagerstroemia calyculata*, *L. tomentosa*, *Pandanus fibrosus*, *Broussonetia papyrifera*, *Curcuma longa*, *Zingiber officinale*, *Combretum roxburghii*, and *Tadehagi triquetrum*.

3.3 Comparison of Medicinal Plant Use among Lao, Tai, and Khmu

The similarity of medicinal plant use among the three ethnic groups was assessed using Jaccard's Similarity Index (JI). The Lao and Tai exhibited the highest similarity, with a JI value of 0.4133, indicating that approximately 41.3% of species were shared between the two groups. This reflects their close cultural and linguistic relationship, as well as overlapping traditions in plant use. By contrast, the Lao and Khmu showed a lower level of similarity (JI = 0.2233; 22.3% shared species), while the Tai and Khmu exhibited the lowest overlap (JI = 0.1818; 18.2% shared species).

These findings underscore the importance of considering ethnic identity and cultural history in ethnobotanical research. While shared species highlight common regional traditions, the distinct practices of the Khmu demonstrate the value of preserving unique indigenous knowledge systems. Documenting both the similarities and differences not only helps to understand cultural dynamics but also identifies priority species for conservation and further pharmacological study.

4. Discussion

The ethnobotanical survey of the Lao, Tai, and Khmu in Pakkading District revealed a rich medicinal flora, comprising 111 species across 54 families. Angiosperms dominated, with Zingiberaceae the most represented family, reflecting its well-documented importance in traditional medicine for treating inflammation, digestive ailments, and wound healing (Panyadee et al., 2019). The prominence of Fabaceae and Phyllanthaceae is consistent with findings from Thailand and Laos, where these families contribute multiple species with diverse therapeutic applications (Phengmala et al., 2024; Sumridpiem et al., 2025).

Differences in species use and plant parts among the three ethnic groups highlight the cultural specificity of ethnomedicinal knowledge. The Lao's preference for Zingiberaceae and extensive use of leaves and fruits parallels observations in Thailand (Van Sam, 2012; Junsongduang et al., 2014), where leaves are favored for their accessibility and high concentrations of bioactive compounds. Preparation methods also revealed both convergence and divergence: decoction dominated among the Lao and Tai, similar to reports from Amnat Charoen Province, Thailand (Junsongduang et al., 2025), whereas the Khmu relied more heavily on fresh consumption, possibly reflecting distinct health beliefs or resource availability (Phumthum et al., 2020). The additional use of cooking, infusion, crushing, and burning further

demonstrates a wide range of techniques aimed at enhancing efficacy and palatability.

Use value (UV) analysis identified *Curcuma longa*, *Hymenocallis littoralis*, and *Blumea balsamifera* as the most highly valued species, corroborating regional studies that emphasize their anti-inflammatory, antimicrobial, and wound-healing properties (Phengmala et al., 2023).

The highest diversity of uses was reported for gastrointestinal, oral health, and general tonic purposes. Species such as *Curcuma longa*, *Houttuynia cordata*, and *Persicaria odorata* were employed for multiple ailments, highlighting their broad therapeutic roles. In addition, the leaves of *Psidium guajava* are of particular interest for their potential use in reducing fishy odor, a property not previously reported. However, Sitthivohane et al. (2021) demonstrated the effectiveness of *Psidium guajava* leaves extract in inhibiting plant-pathogenic fungi. Future studies on Psidium guajava leaves, informed by traditional knowledge of their utilization, may contribute to the development of value-added products.

Jaccard's Similarity Index revealed that, despite geographical proximity, the three ethnic groups exhibit both overlap and divergence in medicinal plant use. The closer affinity between the Lao and Tai may reflect shared linguistic and cultural roots, as well as intergroup exchange, whereas the Khmu maintained distinct practices likely shaped by ecological adaptation and subsistence strategies. This pattern is consistent with other multi-ethnic studies in Southeast Asia, where indigenous groups preserve unique ethnomedicinal systems despite spatial closeness.

Overall, these findings highlight the dynamic interplay between cultural heritage, ecological availability, and social interaction in shaping traditional medicinal plant knowledge. They also reinforce the urgency of preserving ethnobotanical diversity, as increasing cultural homogenization threatens the loss of valuable cultural traditions and biological resources.

5. Conclusion

This study enriches ethnobotanical knowledge by documenting the diversity, preparation methods, and cultural variations in medicinal plant use among the Lao, Tai, and Khmu ethnic groups living in a shared geographic area. The high species diversity, varied processing techniques, and differential reliance on plant parts underscore the complexity of traditional medical systems. Similarities and differences in species use reflect both cultural identity and ecological adaptation, highlighting how ethnobotanical knowledge is embedded within ethnic heritage and environmental context.

Medicinal plants with high Use Values identified in this study merit further phytochemical and pharmacological research to validate their therapeutic properties. The distinct knowledge maintained by the Khmu, alongside the shared practices of the Lao and Tai, emphasizes the importance of culturally sensitive conservation strategies that safeguard both biological resources and traditional practices.

Preserving this ethnobotanical heritage is essential not only for sustaining local health care systems but also for contributing to global biodiversity conservation and the preservation of biocultural knowledge.

6. Conflict of Interest

We certify that there is no conflict of interest with any financial organization regarding the material discussed in the manuscript.

7. Acknowledgments

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Table 1. Families and Species of Medicinal Plants Used by Three Ethnic Groups in Pakkading District, Bolikhamxai Province, Laos. Note: (−) indicates not used.

No.	Local names	Scientific names	Families	UV		
				Lao	Tai	Khmu
1	ປົກໄກ່ດຳ	*Justicia gendarussa* Burm.f.	Acanthaceae	−	−	0.55
2	ຫວ້ານຊິນ	*Crinum asiaticum* L.	Amaryllidaceae	0.75	−	−
3	ພັບພຶງໃຫຍ່	*Hymenocallis littoralis* (Jacq.) Salisb.	Amaryllidaceae	0.78	0.68	0.63
4	ໝາກກອກ	*Spondias pinnata* (L. f.) Kurz	Anacardiaceae	−	0.45	−
5	ເຄືອຕີດຕ່ຳ	*Dasymaschalon glaucum* Merr. & Chun	Annonaceae	−	−	0.68
6	ຜັກໜອກ	*Centella asiatica* (L.) Urb.	Apiaceae	0.68	−	0.48
7	ເຄືອເອັນອ່ອນ	*Ichnocarpus frutescens* (L.) W.T.Aiton	Apocynaceae	−	0.40	0.68
8	ກ້ຶກແຜ່ນດິນເຢັນ	*Aglaonema modestum* Schott ex Engl.	Araceae	−	−	0.70
9	ຫົວກະພຸກ	*Alocasia macrorrhizos* (L.) G.Don	Araceae	−	−	0.93
10	ຕົ້ນຕານ	*Borassus flabellifer* L.	Arecaceae	0.48	0.70	−
11	ຕົ້ນສານ	*Rhapis laosensis* Becc.	Arecaceae	−	−	0.68
12	ໝາກຕອບແຕບ	*Asparagus racemosus Willd.*	Asparagaceae	−	0.45	−
13	ຜັກຄາດ	*Acmella oleracea* (L.) R.K.Jansen	Asteraceae	0.68	−	−
14	ໝາດຫຼວງ	*Blumea balsamifera* (L.) DC.	Asteraceae	0.93	0.93	0.38
15	ຫຍ້າຂີວ	*Chromolaena odorata* (L.) R.M.King & H.Rob.	Asteraceae	0.93	0.98	0.40
16	ປີກະທິງ	*Gymnanthemum extensum* (DC.) Steetz	Asteraceae	0.68	−	0.35
17	ຜັກປັ້ງ	*Basella alba* L.	Basellaceae	−	0.45	−
19	ແຄລ້າວ	*Fernandoa adenophylla* (Wall. ex G.Don) Steenis	Bignoniaceae	−	−	0.23
20	ໝາກລິ້ນໄມ້	*Oroxylum indicum* (L.) Kurz	Bignoniaceae	0.38	−	−
18	ແຄຝອຍ	*Stereospermum fimbriatum* (Wall. ex G.Don) DC.	Bignoniaceae	−	−	0.25
21	ຫຍ້າງ້ອງຊ້າງ	*Heliotropium indicum* L.	Boraginaceae	0.40	−	−
22	ກ້ຶກກ້ານເຫຼືອງ	*Gonocaryum lobbianum* (Miers) Kurz	Cardiopteridaceae	0.35	−	0.55
23	ກ້ຶກພອກ	*Parinari anamensis* Hance	Chrysobalanaceae	0.23	−	−
24	ຜັກສ້ຽນ	*Cleome gynandra* L.	Cleomaceae	−	−	0.20
25	ຫວາຍດິນ	*Combretum roxburghii* Spreng.	Combretaceae	−	−	0.43
26	ກ້ຶກດີປ້ັງ	*Cnestis palala* (Lour.) Merr.	Connaraceae	−	−	0.05
27	ໝາກໂຕ່ນ	*Benincasa hispida* (Thunb.) Cogn	Cucurbitaceae	0.25	0.28	−
29	ຕຳນິນ	*Coccinia grandis* (L.) Voigt	Cucurbitaceae	−	0.48	−
28	ໝາກແຕງ	*Cucumis sativus* L.	Cucurbitaceae	0.85	0.63	0.33
30	ส้าน	*Dillenia obovata* (Blume) Hoogland	Dilleniaceae	0.20	−	−

31	ຕົ້ນສ້ານ	*Dillenia ovata* Wall. ex Hook.f. & Thomson	Dilleniaceae	–	–	0.25
32	ໝາກໝໍ້	*Diospyros brandisiana* Kurz	Ebenaceae	0.43	–	–
33	ຫຍ້າຂີ້ເຂັບ	*Euphorbia tithymaloides* subsp. *smallii* (Millsp.)	Euphorbiaceae	0.05	–	–
34	ໄມ້ຂີ້ໝູ	*Adinobotrys atropurpureus* (Wall.) Dunn	Fabaceae	0.33	–	0.28
35	ຕົ້ນຖົ່ວແຮ	*Cajanus cajan* (L.) Huth	Fabaceae	–	0.18	0.53
36	ຄູນ	*Cassia fistula* L.	Fabaceae	0.25	–	–
37	ຫົວໂລ້ນ	*Parkia sumatrana* Miq.	Fabaceae	–	–	0.43
38	ຕົ້ນສີ້ມສ້ຽວໃຫ່ຍ	*Piliostigma malabaricum* (Roxb.) Benth.	Fabaceae	–	–	0.35
39	ຕົ້ນຄຳພະມ້າ	*Saraca declinata* (Jack) Miq.	Fabaceae	0.28	0.35	0.73
40	ດອກແຄຂາວ	*Sesbania grandiflora* (L.) Pers.	Fabaceae	–	0.43	–
41	ຕົ້ນໜອນໜ່າຍ	*Tadehagi triquetrum* (L.) H.Ohashi	Fabaceae	–	–	0.38
42	ໝາກຂາມ	*Tamarindus indica* L.	Fabaceae	0.53	0.48	–
43	ຕ໊ອຂາວ	*Cratoxylum formosum* (Jack) Benth. & Hook.f. ex Dyer	Hypericaceae	0.43	–	–
44	ໃບຫູເສືອ	*Isodon lophanthoides* (Buch.-Ham. ex D.Don) H.Hara	Lamiaceae	–	–	0.30
46	ຫຍ້າໜວດແມວ	*Orthosiphon aristatus* (Blume) Miq.	Lamiaceae	0.35	–	0.48
45	ງາ	*Perilla frutescens* (L.) Britton	Lamiaceae	0.73	0.43	–
47	ຕົ້ນກະໂດນນ້ຳ	*Barringtonia acutangula* (L.) Gaertn.	Lecythidaceae	0.38	–	–
48	ກະໂດນ	*Careya arborea* Roxb.	Lecythidaceae	0.30	–	0.73
49	ເປືອຍໂຄກ	*Lagerstroemia calyculata* Kurz	Lythraceae	–	–	0.75
51	ກາກະເລົ່າ	*Lagerstroemia speciosa* (L.) Pers.	Lythraceae	–	0.05	–
50	ເປືອຍຂາວ	*Lagerstroemia tomentosa* C.Presl	Lythraceae	0.48	–	0.88
53	ປໍສາ	*Broussonetia papyrifera* (L.) L'Hér. ex Vent.	Malvaceae	–	–	0.58
54	ສີສຽດ	*Pentace burmanica* Kurz	Malvaceae	0.73	–	–
52	ກະເດົ່າຊ້າງ	*Melia azedarach* L.	Meliaceae	–	–	0.30
55	ເຄືອໝໍນ້ອຍ	*Cyclea tonkinensis* Gagnep.	Menispermaceae	0.75	0.33	0.45
57	ຢານາງ	*Tiliacora triandra* (Colebr.) Diels	Menispermaceae	0.88	0.25	0.75
56	ເຄືອເຂົ່າຮໍ	*Tinospora crispa* (L.) Hook. f. & Thomson	Menispermaceae	–	0.28	–
58	ໝາກມີ້	*Artocarpus heterophyllus* Lam.	Moraceae	0.58	–	–
59	ຜັກອີຮຸມ	*Moringa oleifera Lam.*	Moringaceae	–	0.53	–
60	ເລືອດມ້າ	*Knema globularia* (Lam.) Warb.	Myristicaceae	0.30	–	–
64	ຕົ້ນສີດາ	*Psidium guajava* L.	Myrtaceae	0.45	–	–
61	ຜັກສະເມັກ	*Syzygium antisepticum* (Blume) Merr. & L.M.Perry	Myrtaceae	0.40	0.43	0.35

62	ໝາກຫວ້າ	*Syzygium cumini* (L.) Skeels	Myrtaceae	0.35	–	–
63	ຂະເມັກ	*Syzygium gratum* (Wight) S.N.Mitra	Myrtaceae	0.23	0.35	–
65	ໂຄຍສຽກ	*Olax imbricata* Roxb.	Olacaceae	0.28	–	–
66	ນົມງົວ	*Olax scandens* Roxb.	Olacaceae	0.40	–	–
67	ໝາກຕະລິມປີ້ງ	*Averrhoa bilimbi* L.	Oxalidaceae	0.95	–	0.28
68	ໝາກເຟືອງ	*Averrhoa carambola* L.	Oxalidaceae	–	–	0.23
69	ເຕີຍ	*Pandanus fibrosus* Gagnep.	Pandanaceae	–	–	0.40
70	ໝາກໄຟ	*Baccaurea ramiflora* Lour.	Phyllanthaceae	–	–	0.18
71	ນົມຍານ	*Barringtonia macrostachya* (Jack) Kurz	Phyllanthaceae	–	–	0.23
72	ໝາກໃຕ້ໃບ	*Phyllanthus amarus* Schumach. & Thonn.	Phyllanthaceae	0.95	–	0.60
73	ຜັກຫວານບ້ານ	*Phyllanthus androgynus* (L.) Chakrab. & N.P.Balakr.	Phyllanthaceae	0.35	–	–
74	ໝາກຂາມປ້ອມ	*Phyllanthus emblica* L.	Phyllanthaceae	0.23	0.73	0.95
75	ໃບຟູ	*Piper betle* L.	Piperaceae	0.70	–	–
76	ຜັກອີເລີດ	*Piper sarmentosum* Roxb.	Piperaceae	0.43	–	–
77	ຫຍ້າຜັກຄວາຍ	*Eleusine indica* (L.) Gaertn.	Poaceae	–	–	0.70
78	ຫຍ້າຄາ	*Imperata cylindrica* (L.) Raeusch	Poaceae	0.40	038	–
79	ຜັກແພວ	*Persicaria odorata* (Lour.) Soják	Polygonaceae	0.45	0.30	0.43
80	ກະແຕໄຕ່ໄມ້	*Drynaria quercifolia* (L.) J.Sm.	Polypodiaceae	0.28	–	–
81	ເໝືອດຂົນ	*Heliciopsis terminalis* (Kurz) Sleumer	Proteaceae	–	0.48	0.40
82	ກຳລັງເສືອໂຄ່ງ	*Ziziphus attopensis* Pierre	Rhamnaceae	0.50	–	0.70
83	ກະທັນ	*Ziziphus jujuba* Mill.	Rhamnaceae	0.33	0.43	–
84	ຕົ້ນໝາກເລັບແມວ	*Ziziphus oenopolia* (L.) Mill.	Rhamnaceae	–	–	0.28
86	ໝາກຍໍ	*Morinda citrifolia* L.	Rubiaceae	0.60	0.75	–
87	ເຄືອໝ້ອຍເລືອດ	*Paederia foetida* L.	Rubiaceae	–	–	0.50
85	ກະດອມ	*Ridsdalea thailandica* (Tirveng.) J.T.Pereira	Rubiaceae	0.43	0.30	–
88	ຂີ້ຫູດ	*Citrus hystrix* DC.	Rutaceae	0.70	0.58	–
89	ລຳໄຍ	*Dimocarpus longan* Lour.	Sapindaceae	–	–	0.33
90	ໝາກຫວດ	*Lepisanthes fruticosa* (Roxb.) Leenh.	Sapindaceae	–	–	0.60
91	ແງວປ່າ	*Nephelium hypoleucum* Kurz	Sapindaceae	0.48	0.30	–
92	ຄູນໝາກຄໍ້ສົ້ມ	*Schleichera oleosa* (Lour.) Oken	Sapindaceae	0.60	0.45	–
93	ຜັກຄາວທອງ	*Houttuynia cordata* Thunb.	Saururaceae	0.43	0.40	0.43
94	ຜັກສະແງ້ນາ	*Limnophila geoffrayi* Bonati.	Scrophulariaceae	0.40	0.35	–
95	ໝາກເລັ່ນ	*Solanum lycopersicum* L.	Solanaceae	0.50	0.35	–
96	ໝາກຄາຍ	*Solanum stramonifolium* Jacq.	Solanaceae	0.43	0.28	–
97	ຄ້າຍໂຊ້	*Schima wallichii* (DC.) Korth.	Theaceae	0.15	–	–

98	ເກດສະຫນາ	*Aquilaria crassna* Pierre ex Lecomte	Thymelaeaceae	–	–	0.70
99	ເຄືອເຂົ່າປຸນ	*Cissus nodosa* Blume	Vitaceae	–	–	0.48
100	ເຄືອສີ້ມປຸນ	*Cissus repens* Lam.	Vitaceae	–	–	0.60
101	ຄ່າໂຄມ	*Alpinia calcarata* (Andrews) Roscoe	Zingiberaceae	–	–	0.43
102	ຂ່າ	*Alpinia galanga* (L.) Willd.	Zingiberaceae	0.93	0.40	–
103	ຂ່າຂຽວ	*Alpinia haenkei* C.Presl	Zingiberaceae	–	–	0.55
104	ໝາກແໜ່ງຂີ້ນ	*Amomum* sp.	Zingiberaceae	–	–	0.48
105	ຂໍ້ມຶ້ນ	*Curcuma longa* L.	Zingiberaceae	1.00	0.98	0.93
106	ຂີງດຳ	*Kaempferia parviflora* Wall. ex Baker	Zingiberaceae	0.85	0.43	–
107	ໝາກແໜ່ງຂຽວ	*Wurfbainia uliginosa* (J.Koenig) Giseke	Zingiberaceae	–	–	0.43
108	ໝາກແໜ່ງແດງ	*Wurfbainia villosa* (Lour.) Škorničk. & A.D.Poulsen	Zingiberaceae	–	–	0.50
109	ໝາກແໜ່ງ	*Wurfbainia villosa* var. *xanthioides* (Wall. ex Baker)	Zingiberaceae	–	–	0.48
110	ຫວ້ານໄຟ	*Zingiber montanum* Roscoe	Zingiberaceae	0.48	0.70	–
111	ຂີງ	*Zingiber officinale* Roscoe	Zingiberaceae	0.93	0.88	0.85

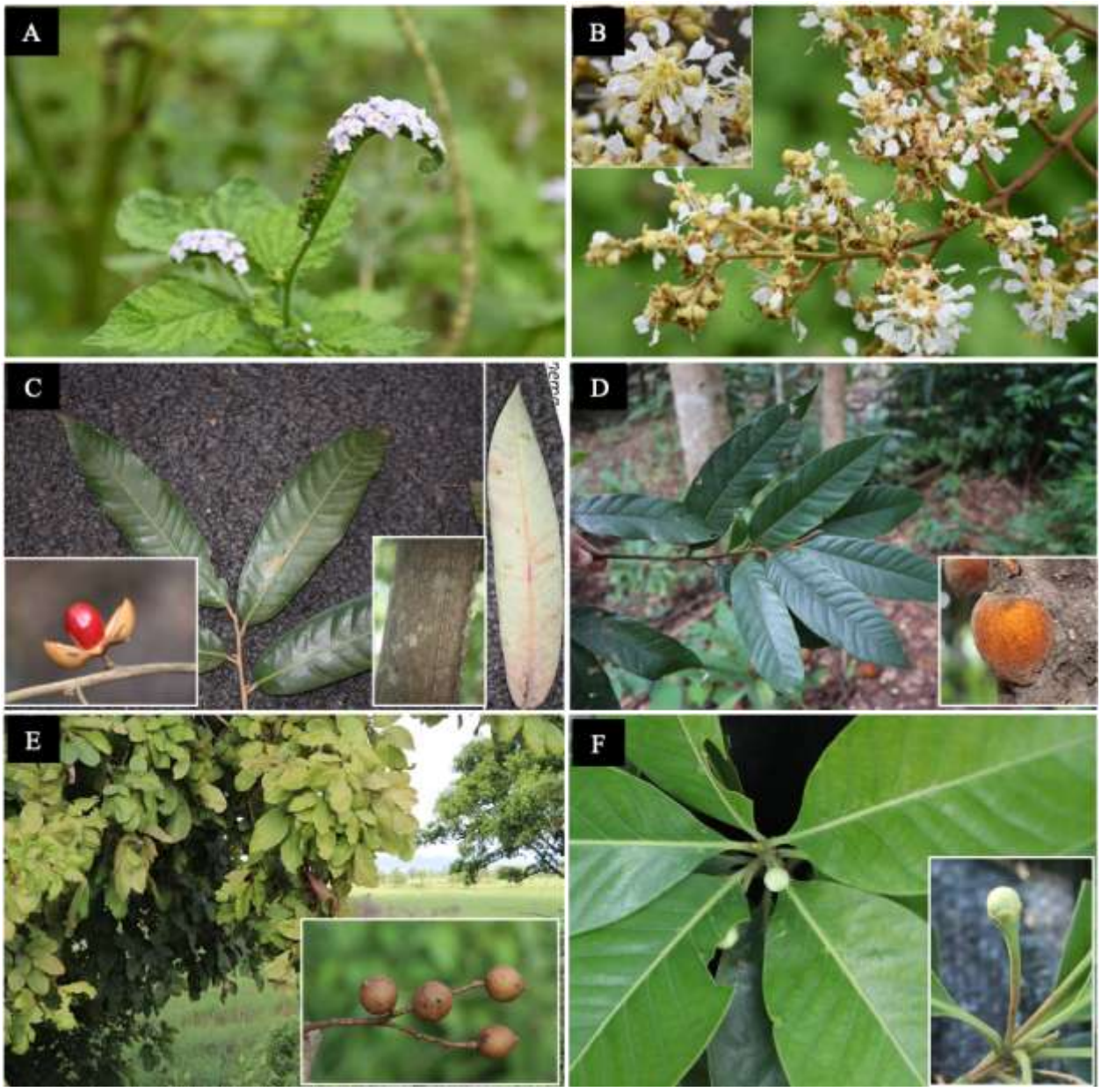

Figure 1. Some medicinal plants that used by the Three Ethnic Groups. A. ຫຍ້າງ້ວງຊ້າງ (*Heliotropium indicum* L.), B. ເປືອຍຂາວ (*Lagerstroemia tomentosa* C.Presl), C. ເລືອດມ້າ (*Knema globularia* (Lam.) Warb.), D. ໝາກຫມໍ້ (*Diospyros brandisiana* Kurz), E. ໝາກຄໍ້ສີ້ມ (*Schleichera oleosa* (Lour.) Oken), F. ຄ້າຍໂຊ້ (*Schima wallichii* (DC.) Korth.).