

Ethnobotanical knowledge of Isaan Laos tribe in Khong Chai District, Kalasin Province, Thailand with particular focus on medicinal uses

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Abstract. Niamngon P, Saensouk S, Saensouk P, Junsongduang A. 2023. Ethnobotanical knowledge of Isaan Laos tribe in Khong Chai District, Kalasin Province, Thailand with particular focus on medicinal uses. *Biodiversitas* 24: 6793-6824. Isaan Laos ethnic group in Khong Chai District, Kalasin Province, Thailand hold a unique ethnobotanical knowledge on plant utilization, yet such knowledge and wisdom are facing gradual erosion due to modernization. Therefore, this study aimed to investigate comprehensively the ethnobotanical knowledge on the uses of plants among the Isaan Laos ethnic group residing in Khong Chai District. Data was gathered between July 2022 and July 2023 via vegetation survey, semi-structured interviews and focus group discussions with 23 villagers residing in village adjacent to the forested area to collect data on plant local names and its utilization. The data was then analyzed for Cultural Important Index (CI), Informant Agreement Ratio (IAR), and Fidelity Level (%FL). In total, Isaan Laos ethnic group in Khong Chai District utilize 291 plant species belonging to 229 genera and 88 families for various purposes. These plants are further categorized into 12 groups based on their traditional uses, including 168 species used for food and spices, 109 species for medicinal purposes, 74 species for ornamental purposes, 40 species for construction materials, 35 species for beliefs and rituals, 27 species for fuels, 20 poisonous species, 17 species for beverages, 5 species for dyeing, 4 species for cosmetics and perfumery, 3 species for industrial crops and 2 species for apparel. *Oryza sativa* is the most often utilized plant, with a CI value of 4.74, followed by *Senna siamea* (3.39) and *Pandanus amaryllifolius* (3.30). The body ache with the highest Index of IAR=0.94 is associated with *Curcuma longa*, which has the highest values of Fidelity Level (%FL). The most common use of *Curcuma longa* is to treat flatulence and expelling wind, as well as skin illness. Additionally, *Curcuma longa* has the highest CI value of 9.83. This study recorded ethnobotanical data in detail as fundamental knowledge for the conservation of plants to be utilized by future generations.

Keywords: Don Chan Districts, ethnic groups, ethnobotany, Isaan Laos, Khong Chai Districts

Abbreviations: CI: Cultural Important Index, IAR: Informant Agreement Ration, %FL: Fidelity Level

INTRODUCTION

Thailand is a nation situated in tropical region of Southeast Asia with diverse ecological zones. There are various ecosystems in the country which become the habitats of a great number of biodiversity, including plants and animals (Robinson 2007). Throughout history, such biological diversity has been utilized for various benefits to the people including for food, shelter, clothing and medicine (Maknoi et al. 2016). The traditional knowledge on the utilization of biodiversity was derived from practical encounters with diverse species, wherein the accrued benefits have been passed down through multiple generations, ultimately culminating in the establishment of distinct cultural practices (Saisor et al. 2021).

Nonetheless, the utilization of biological resources varies across different localities, as it is influenced by factors such as the way of life of local communities, cultural practices, traditional knowledge, inherited beliefs, and the availability of local resources (Sudchaleaw et al. 2023). As a result of their utilization, each tribe and

generation may exhibit variations or patterns in their behavior (Pholhiamhan et al. 2018). Presently, the exploitation and utilization biological resources continues to persist, including a variety of plants used in the field of medicine (Phumthum et al. 2020).

Worldwide, the examination of plant biodiversity and its diverse uses has been explored in various academic papers, for example Supiandi et al. (2019), Mutaqin et al. (2020), Rahman and Asha (2021), and Fadhillah et al. (2023). In Thailand, the study of biodiversity underscores the importance of ethnobotanical knowledge and practices held by local community. For this reason, there is an increased focus on studying the use of local plants obtained from natural sources with several researchers conducting studies on such theme including Pholhiamhan et al. (2018), Junsongduang et al. (2021), Numpulsuksant et al. (2021), Phatlamphu et al. (2021), Saisor et al. (2021), and Chaisoung et al. (2023).

Kalasin is one of the 20 provinces of Thailand located in the northeastern region of the country. This province has an extent of approximately 4,341,716.25 rai (or 6,946.75

km²), which corresponds to 4.5 percent of the total area of Thailand. Despite the relatively small extent, this province has a significant level of plant richness. The province is dominated by the Isaan Laos ethnic group (Numpulsuksant et al. 2021). Kalasin Province comprised of 18 districts, 135 sub-districts, and 1,584 villages. One of the sub-districts in this province is Lam Chi Sub-district in Khong Chai District which consists of 8 villages (Phatlamphu et al. 2021, 2023). Lam Chi Sub-district consists of predominantly flat ground with gently rolling slopes and has a total land area of 20,630 rai (or 33.01 km²), which comprises several categories of land use. Specifically, there are roughly 16,145 rai (or 25.83 km²) designated for agricultural purposes, 954 rai (or 1.53 km²) allocated for fruit and vegetable cultivation, 582 rai (or 0.93 km²) designated for rural community activities, 634 rai (or 1.01 km²) designated as wetland areas, and 2,315 rai (or 3.70 km²) designated as bodies of water (Phatlamphu et al. 2023).

Initial report published by Office of the National Cultural Commission in 2004 and the Kalasin Provincial Public Relations Office in 2013 suggested that Sadam Sri village in Lam Chi Sub-district shows a notable prevalence of plant species diversity. Hence, there is a scholarly interest in doing a study on plant diversity and its roles to Lao Isan ethnic community residing in the Sadam Sri village region. The local people in Sadam Sri village have high level of utilization of plants into their daily routines for various purposes such as sustenance, medicinal applications, clothings, and shelter. Currently, due to modernization, the younger generation is utilizing plants, particularly herbs, less frequently than previous generations.

As a result, the transition from a predominantly rural to an increasingly urbanized society may result in the gradual erosion of traditional knowledge and wisdom pertaining to the utilization of plants. Therefore, this study aimed to investigate comprehensively the ethnobotanical knowledge on the uses of plants among the Isaan Laos ethnic group residing in Khong Chai District, Kalasin Province. The results of this study might serve as scientific document and reference for the preservation of traditional knowledge and the advancement of medicinal plants to be aligned with sustainable agricultural and commercial prospect, ensuring their availability for future generations.

MATERIALS AND METHODS

Study area

The study was conducted in Sa Dam Si village area (Figure 1), which is located in Lam Chi Sub-district, Khong Chai District, Kalasin Province, in northeastern Thailand. The village is located at an altitude of approximately 140 meters above sea level. The study covered a total area of 725 rai (or 1.16 km²). There are approximately 90 homes and a population of around 235 people in the area. The main agricultural activities include cultivating rice and traditional vegetable and farming eucalyptus. The area has three distinct seasons, namely summer which occurs from March to May, rainy season which lasts from May to October, and winter which extends from October to February (Kalasin Provincial Office SIPD 2023).

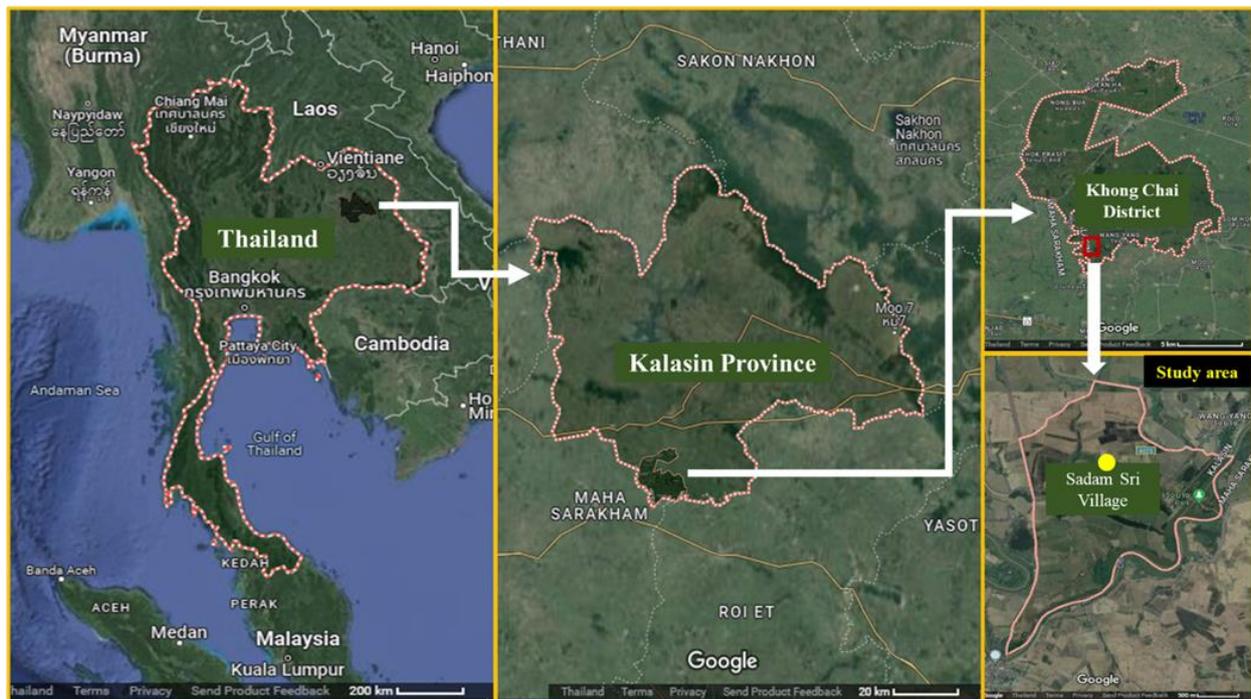


Figure 1. Map of study area in Sa Dam Si Village Khong Chai Districts, Kalasin Province, Northeastern Thailand (source: Google maps)

Data collection

Botanical survey

Botanical survey was conducted in Sadam Sri Village. The survey and collection of plant samples were carried from July 2022 to July 2023, at a rate of 3-4 samples per month. The survey encompassed the forested areas, residential and other areas within the village. The survey also entailed validating accurate botanical data, such as the scientific names, native names, sources, and potential advantages or dangers associated with the plants. Specimens of the reported plants were collected, dried, properly identified, and vouchers deposited at the Mahasarakham University Herbarium, Mahasarakham, Thailand. Plant identification was based largely on taxonomic literatures in particular The Flora of Thailand. The plant specimens were placed in a material bag which can be further examined by experts or used for additional research using plant identification keys, reference books, and botanical documents such as Mokkamul et al. (2013), Low et al. (2014), Rahman et al. (2014), Smitinand (2014), Thongpukdee et al. (2014), Van Welzen et al. (2014), Bongcheewin et al. (2015), Esser and Saw (2015), Paton et al. (2016), Saensouk et al. (2016; 2018; 2021a, b, c, d; 2022a, b). The following studies have been referenced: Ye and Xia (2016); Bongcheewin et al. (2017); Leeratiwong et al. (2017); Chen et al. (2018); Rather et al. (2018); Souvannakhommane et al. (2018); Boonma and Saensouk (2019); Choopan et al. (2019); Ezedin and Weiblen (2019); Saensouk and Saensouk (2019a, b; 2020a, b, c; 2021a, b, 2023); Boonma et al. (2020a, b, 2021, 2023); Chen et al. (2020); Rokade et al. (2020); Chantaranonthai (2021); Esser (2021); Johnson et al. (2021); Kumar et al. (2021); Lim et al. (2021); Orlandini et al. (2021); Sathaphorn et al. (2021); Bongcheewin et al. (2022); Chantaranonthai et al. (2022); Ngernsaengsarauay et al. (2022); Ragsasilp et al. (2022); Rakarcha et al. (2022); Singh (2022); Tagane et al. (2022); Tarmizi et al. (2022); Zhang et al. (2022); Inta et al. (2023); POWO (2023).

Ethnobotanical study

Information on the utilization of plants was collected from informants. A sample of respondents representing 10 percent of the population within the research area, specifically individuals aged 20 and above, were interviewed. Ethnobotanical data on the various uses of plants were collected, including but not limited to food and spices, beverages, medical herbs, toxic plants, dye-producing plants, cosmetics and perfumes, textiles, construction materials, religious and ceremonial uses, fuel sources, attractive plants, and industrial crops (Pholhiamhan et al. 2018; Saensouk et al. 2018; Junsongduang et al. 2021; Numpulsuksant et al. 2021; Phatlamphu et al. 2021; Saisor et al. 2021).

Data analysis

The plant data were classified based on the family group, scientific name, native names, and the utilization of plants in twelve different categories, including food and spices, beverages, medicinal herbs, poisonous plants, dye plants, cosmetics and perfumery, apparel, construction materials, beliefs and rituals, fuel, ornamental plants, and

industrial crops. The classification also included information on the specific parts of the plants that are used. The data was subsequently subjected to quantitative analysis.

The quantitative data was analyzed using the ethnobotanical index to calculate the Cultural Importance Index (CI) (Sutjaritjai et al. 2019), Informant Agreement Ratio (IAR) (Trotter and Logan 1986; Heinrich et al. 1998), and Fidelity Level (%FL) (Friedman et al. 1986).

Cultural Importance Index (CI)

The CI, a quantitative measure similar to Use Value (UV), assesses the local significance of a specific plant. However, the CI distinguishes itself by categorizing usage reports into groups according to the type of utilization. Therefore, it becomes feasible to determine the specific plant species that hold significance in various types of utilization. In contrast, UV just acknowledges the importance of plant species in a particular area without specifying the nature of their significance (Tardío and Pardo-de-Santayana 2008). CI was calculated as follow:

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

Where:

CI : Cultural significance index of the plant

UR : Utilization report in that utilization group

I : Number of plant groups divided by utilization

NC : Total number of utilization

N : Number of informants

Informant Agreement Ratio (IAR)

IAR indicates the acceptance among informants with values range from 0 to 1. If the index of IAR approaches or reaches 1, the medicinal plant is deemed acceptable by a significant number of informants. Consistency, as seen by widespread acceptance, is a valuable approach to utilizing therapeutic plants (Trotter and Logan 1986; Heinrich et al. 1998). IAR was calculated as follow:

$$IAR = \frac{(N_{ur} - N_t)}{N_{ur} - 1}$$

Where:

N_{ur} : Number of reports of specific use of plant species in each disease syndrome obtained from all informants

N_t : Number of plant species used in each syndrome

Fidelity Level (%FL)

FL is used to analyze which plants are the most interesting to be used to treat diseases in each syndrome. Because in each syndrome, several plants may be used for treatment. FL was calculated as follow:

$$\%FL = \left(\frac{N_p}{N} \right) \times 100$$

Where:

N_p : Number of reported utilization of the plant for that syndrome

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

RESULTS AND DISCUSSION

Diversity of plants

The results of ethnobotanical study showed that Isaan Laos ethnic group in Sadam Sri Village utilize a total of 291 species belonging to 229 genera and 88 families for various purposes. The Fabaceae family has the highest number of species, with 32 species, followed by the Araceae family with 14 species, and the Cucurbitaceae and Zingiberaceae families each with 12 species (Table 1). This result agrees with the research conducted by Thongpukdee et al. (2014), which revealed that the predominant plant species used in Huai Mek District, Kalasin Province, belong to the families Fabaceae, Cucurbitaceae, and Apiaceae. Similarly, Phatlamphu et al. (2021) research presents data on the ethnobotany of edible plants in Mueang District, Kalasin Province. Two often-utilized plant families are Fabaceae and Zingiberaceae.

The plants used in Sadam Sri Village, Kong Chai District, Kalasin Province can be classified into three groups: wild plants (100 species), cultivated plants (182 species), and aquatic plants (15 species). Among these, 39 wild plant species were also found in cultivation, while 6 aquatic plant species were also found in cultivation. As many as 61 species are exclusively wild plants, whereas 176 species are exclusively found in cultivation, and 9 species are confined only to aquatic plants (Figure 2).

Phenology

The period of flowering and fruiting is divided into 3 seasons: summer, rainy and winter. During the summer months of February to May, 9 species are blooming and 5 species producing fruit. In the rainy season from June to

September, 11 species are blooming and 6 species producing fruit. In the winter months of October to January, 11 species are blooming and 3 species producing fruits. As many 64 species are blooming in cycles during the summer and rainy seasons, producing 55 different types of fruit. Similarly, during both the rainy and winter seasons, there are 34 species that blooming in cycles with 26 species producing fruit. Furthermore, there are 41 species that bloom in cycles during the winter and summer seasons, with 36 species producing fruit. In addition, there are 79 species are blooming continuously with 57 species producing fruit (Figure 3).

Plant part used

The most commonly used plant parts are leaves, aerial stems and whole parts (Figure 4). Leaves are the most often utilized plant parts for food, spices, and medicinal herb preparation, in comparison to other plant parts (Figure 4).

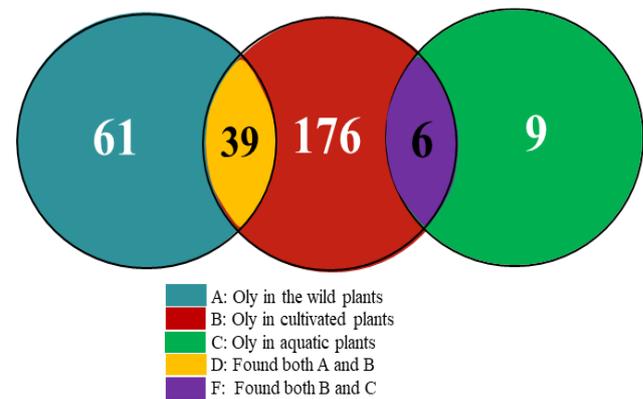


Figure 2. The number of species encountered, divided into three groups: Wild plants, cultivated plants, and aquatic plants

Table 1. Plant family used by Isaan Laos ethnic group in Sadam Sri Village, Lam Chi Subdistrict, Kong Chai District, Kalasin Province

Family	Number of species
Fabaceae	32
Araceae	14
Cucurbitaceae, Zingiberaceae	12
Arecaceae	11
Apocynaceae, Poaceae, Solanaceae	10
Asteraceae, Euphorbiaceae, Lamiaceae, Rubiaceae	7
Asparagaceae, Moraceae	6
Apiaceae, Bignoniaceae, Dipterocarpaceae, Myrtaceae	5
Amaryllidaceae, Anacardiaceae, Musaceae, Phyllanthaceae, Piperaceae, Rutaceae, Sapindaceae	4
Annonaceae, Brassicaceae, Combretaceae, Dioscoreaceae, Lythraceae, Malvaceae, Menispermaceae	3
Acanthaceae, Alismataceae, Bromeliaceae, Cactaceae, Clusiaceae, Costaceae, Cyperaceae, Ebenaceae, Iridaceae	2
Lecythidaceae, Meliaceae, Nyctaginaceae, Oxalidaceae, Passifloraceae, Rhamnaceae	
Amaranthaceae, Asphodelaceae, Basellaceae, Caricaceae, Cannabaceae, Cannaceae, Capparaceae, Chrysobalanaceae	1
Cleomaceae, Commelinaceae, Convolvulaceae, Crassulaceae, Cyatheaceae, Elaeocarpaceae, Gentianaceae, Hydrocharitaceae, Hypericaceae, Irvingiaceae, Lauraceae, Marsileaceae, Molluginaceae, Moringaceae, Muntingiaceae, Nelumbonaceae, Nymphaeaceae, Oleaceae, Opiliaceae, Orchidaceae, Pandanaceae, Pedaliaceae, Plantaginaceae, Polygonaceae, Pontederiaceae, Portulacaceae, Primulaceae, Rosaceae, Sapotaceae, Saururaceae, Stemonaceae, Strelitzaceae, Talinaceae	

Cultural Important Index (CI) and 12 plant utilization aspects

We divided the uses of plants by Isaan Laos ethnic group into 12 aspects as shown in Table 2, Table 3 and Figure 5, where the Cultural Important Index (CI) values are reported partially in line with those reported by Pholhiamhan et al. (2018). The summary of each aspect is explained below.

Food and spices

According to interviews with several informants, it was discovered that Sadam Sri Village consists of 168 species of plants used for food and spices. The plant with the highest CI value of 4.74 is *Oryza sativa*. This is followed by *Senna siamea* with a CI value of 3.39, and *Pandanus amaryllifolius* with a CI value of 3.30. *O. sativa*, commonly known as rice, serves as the major food staple of the Thai population, including the Isaan Laos ethnic group, while *S. siamea* and *P. Amaryllifolius* are used their leaves as sustenance.

Medicinal herbs

There are 109 species of medicinal herbs. The plant with the highest CI (3.39) is *Senna siamea*, followed by *Pandanus amaryllifolius* (3.30) and *Curcuma longa* (3.26). For example, the leaves of *S. siamea* can be boiled to alleviate symptoms such as antidiuretic and anthelmintic effects. Similarly, the leaves of *P. amaryllifolius* can be boiled to treat symptoms of hypertension. Additionally, the crushed rhizome of *C. longa* can be used to cure flatulence, expel wind, and alleviate skin diseases.

Ornamental plants

There are 74 species used for ornamental plant with *Clitoria ternatea* has the highest CI value of 2.87. It is followed by *Helianthus annuus* with a CI value of 2.52 and *Ananas comosus* with a CI value of 2.22. Ornamental plants are cultivated to enhance the aesthetic appeal of houses. There are large trees, shrubs, and herbaceous plants used as ornament.

Construction and housing materials

A total of 40 species are used for construction and housing materials. Among these, *Senna siamea* has the highest CI value of 3.39, followed by *S. garrettiana* with a CI value of 2.96, and *Bambusa multiplex* with a CI value of 2.87. The stem has diverse applications in the construction of furniture, tools, and housing structures.

Beliefs and rituals

The study found 35 plant species with their corresponding uses related to beliefs and rituals. Among these species, *Oryza sativa* has the highest CI value of 4.74, followed by *Cocos nucifera* and *Solanum aculeatissimum*, each with a CI value of 3.09. *Oryza sativa* and *C. nucifera* are utilized in the cultural practices and beliefs of the Isaan Laos ethnic groups, particularly in religious and burial ceremonies. Additionally, *S. aculeatissimum* is utilized in the Teacher's Day ceremony.

Fuels

The fuel plant consists of 27 species. Among these, *Senna siamea* has the highest CI value of 3.39, followed by *Senna garrettiana* with a CI value of 2.96, and *Diospyros mollis* with a CI value of 2.83. The stem is utilized for the purpose of firewood and the production of charcoal.

Poisonous plant

There are 20 species of poisonous plants. The species with the highest CI (4.74) is *Oryza sativa*, followed by *Solanum aculeatissimum* (3.09) and *Carica papaya* (3.00). The leaves of *O. sativa* and *S. aculeatissimum* are covered in fine hairs, which can cause skin irritation. Similarly, the latex of *C. papaya* can also lead to skin irritation.

Drink and beverage

A total of 17 plant species are used to make drinks and beverages. The plant with the highest CI (4.74) is *O. sativa*, followed by *P. amaryllifolius* (3.30) and *C. nucifera* (3.09). The grains of *O. sativa* undergo steaming and fermentation to produce a beverage, while the leaves of *P. amaryllifolius* are boiled, and the seeds of *C. nucifera* are made into a drink.

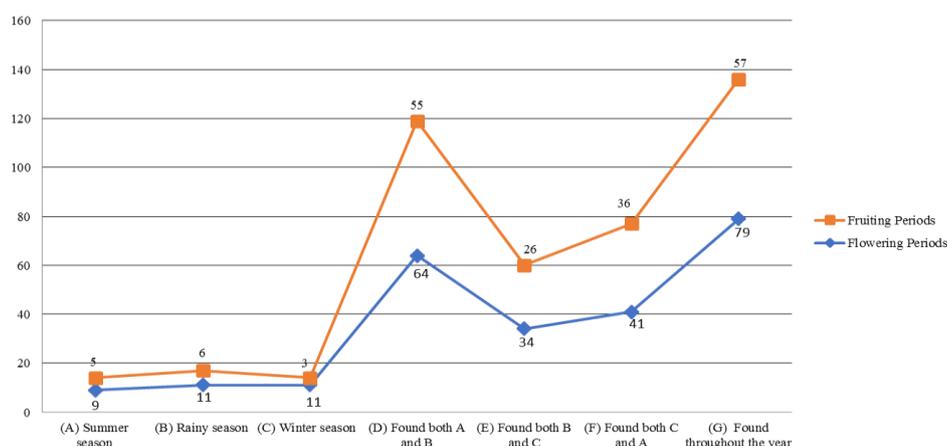


Figure 3. The phenology of plants in Sadam Sri Village, Lamchi Sub-district, Khong Chai District, Kalasin Province, Thailand

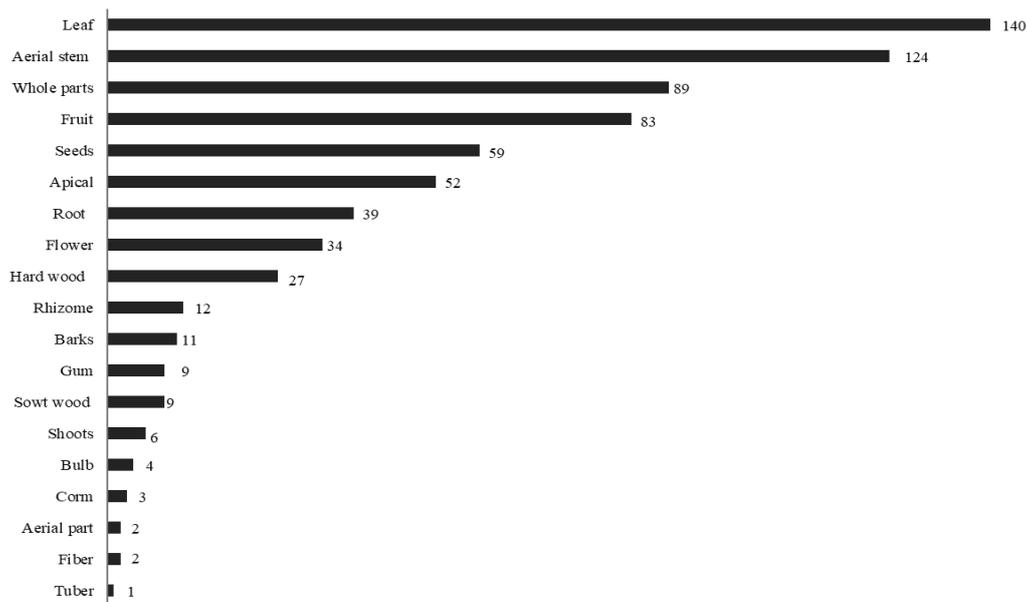


Figure 4. Number of plant part used in Sadam Sri Village, Lamchi Sub-district, Khong Chai District, Kalasin Province, Thailand

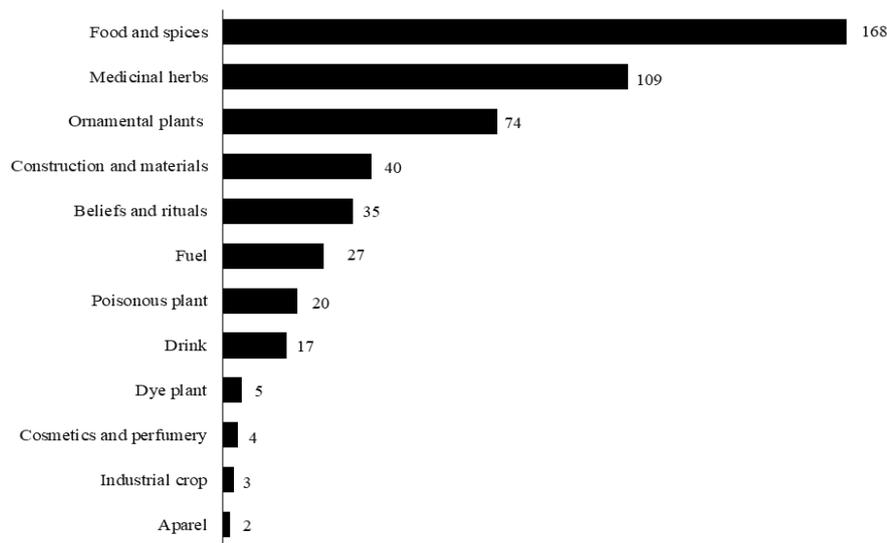


Figure 5. Numbers of plant species in various categories of utilization

Dye plant

There are 5 species used for dye. The species with the highest CI is *S. siamea*, which has a CI value of 3.39. It is followed by *Curcuma longa* with a CI value of 3.26, and *D. mollis* with a CI value of 2.83. The stems of *S. siamea* and *D. mollis* can be immersed in water or boiling to acquire a yellow and black coloration, while the rhizome of *C. longa* turns yellow when it is ground.

Cosmetics and perfumery

The uses for cosmetics and perfumery can be observed in 4 species, namely *Pandanus amaryllifolius* with the highest Concentration Index (CI) of 3.30, followed by *Curcuma longa* with a CI value of 3.26, and *Citrus hystrix* with a CI value of 2.74. *P. amaryllifolius* leaves are utilized

in the production of perfumes, while *C. longa* rhizomes are pulverized for use in cosmetics and perfumes. Additionally, the fruit of *Curcuma longa* is ground to be used in perfumery.

Industrial crop

Three plant species are used for industrial crop consists, including *Oryza sativa* with the greatest CI (4.74), followed by *Eucalyptus abdita* (2.35) and *Nelumbo nucifera* (2.22). The plants serve as sustenance for the individuals residing in the family and can also serve as a source of revenue.

Apparel and clothing

There are 2 species used for apparel and clothing, i.e., *Ceiba pentandra* with CI value of 2.17 is the highest,

followed by *Gossypium herbaceum* with a value of 2.00. The fruit of *C. pentandra* and *G. herbaceum* is fibrous and is utilized for weaving.

The research by Pholhiamhan et al. (2018) indicated that the Phu Thai people utilized a total of 329 plant species belonging to 89 different families in their everyday activities. The CI values were calculated for *Oryza sativa* L. (CI = 2.74), *Saccharum officinarum* (CI = 2.64), and *Cocos nucifera* (CI = 2.57), respectively. While the research of Phatlamphu et al. (2021) has identified edible plant species that have been reported in the Mueang District area of Kalasin Province which they found a total of 140 plant species distributed in 125 genera and 62 families. *Tamarindus indica* species had the highest importance among edible plants, with a CI value of 2.65, followed by *Bambusa bambos* with a CI value of 2.00 and *Citrus hystrix* with a CI value of 1.90. *Tamarindus Indica* is the edible plant used as a fruit, and their young leaves can be used in cooking to give a sour flavor by transforming into a tamarind pulp. Moreover, its fruit can be used as a laxative; the heartwood is used as a traditional way to care for women after giving birth. Its stem can be used to make furniture, tools and building materials. In addition, several people grow tamarind trees at the front of their house, as they believe that tamarind would help the inhabitant get respect from other people. While *B. bambos* was used for its shoots for foods and its stem can be used for several purposes such as bamboo can be used as a construction material, handicraft, and furniture. *Citrus hystrix* has its fruit and leaves used to make food fragrant and appetizing. In traditional medicine, it is used as an ingredient in a traditional formula to make Thai herbal compress balls, which are steamed before being applied to the human body in traditional Thai massages. Numpulsuksant et al. (2021) conducted a study and discovered a total of thirty-eight medicinal plants, which were classified into 35 genera and 23 families. *Antiaris toxicaria*, a native plant of the Ban Hua Kua village, has the highest use-value of 0.68 among all species, while *Diospyros mollis* had CI value of 0.21. The plants with the highest Cultural Importance Index (CI) were *Dialium cochinchinense* (CI = 0.21), *Anisomeles indica* (CI = 0.21), *Vitex glabrata* (CI = 0.21), *Aegle marmelos* (CI = 0.21), *Phyllanthus emblica* (CI = 0.21), and *Hesperethusa crenulata* (CI = 0.21). Additionally, *Diospyros mollis*, *Dialium cochinchinense*, *Anisomeles indica*, *Vitex glabrata*, *Phyllanthus emblica*, *Aegle marmelos*, and *Hesperethusa crenulata* were also identified.

Informant Agreement Ration (IAR)

According to an interview with a local healer from Sadam Sri Village, there are 109 plant species for medicinal uses. The plants are mostly utilized for antitussive, cold-relieving, and mucolytic ailments, with a total of 45 species. They are also commonly employed for alleviating flatulence and expelling wind, with 43 species, as well as treating various skin diseases, with 42 species. The bodily pains had the highest IAR values (IAR = 0.94), while potency had the lowest IAR value (IAR = 0.67). The treatment of disorders and their associated symptoms are listed separately in Table 4, comprising 20 main categories.

Fidelity Level (%FL)

Fidelity Level (%FL) is an index used to analyze the most preferred medicinal plants for treating particular ailment or disease. In being used to treat disease in each symptom, the high number of reports of its use indicates that the plants are used in the same direction, or each informant has used plants to treat a disease syndrome in the same way, with the highest value equal to 100%. However, when the %FL of a plant is low it indicates that the plant has been used for multiple purposes or for multiple syndromes (Friedman et al. 1986).

There are 109 species of medicinal plants used by the Isaan Lao ethnic group. The results of the study found that 12 species of medicinal plants were used in the same direction with the highest value equal to 100% such as *M. indica*, *S. koetjape*, *A. puncticulatum*, *S. oleosa*, *S. lycopersicum*, *Averrhoa carambola*, *G. schomburgkiana* and *M. alba*, where parts of the fruit are eaten fresh to be used as a laxative to treat constipation. As for *B. macrophylla*, the fruit parts are commonly eaten fresh to relieve flatulence and expel wind. In addition, the stems and leaves of *T. crispata* are boiled and drunk to nourish the uterus, etc. (as shown in Table 5 and Table 6).

A low %FL indicates that medicinal plants are used for a variety of disease symptoms. The medicinal plants with the highest number of reported uses are *C. longa*. The plant is used to treat 14 symptoms groups of diseases by boiling the rhizomes or eating them fresh, or grinding them and applying them to the body, or applying them to wounds and compressing the body to help treat symptoms of disease. It can be used in a variety of ways, including treating flatulence and expel wind (10.2%), treating skin diseases (10.2%), treating hemorrhoids (8.8%), nutritious (8.8%), treating insect bites (8.8%), treating wounds and injuries (8.4%), treating female, pregnancy, birth and puerperium (8.4%), laxatives (7.1%), treating body aches (7.1%), diuretics (6.6%), treating cancer (5.3%), treating anthelmintic (4.9) treat diabetes mellitus (2.7%) and hypertension (2.7%), respectively. Next is *N. nucifera* which is used to treat 10 disease symptoms groups. The roots are boiled and drunk to lower high blood pressure (27.6%). Roots are eaten raw to relieve flatulence and expel wind (19%). Flowers are used to smell to relieve dizziness (17.2%), boiled and drunk to antitussis, cold and mucolytic (12.1%). The leaf are crushed and applied to the skin affected by skin lesions (8.6%). This includes boiling the roots to treat hypertension (3.4%), cancer (3.4%), heart disease (12.3%), female genital problems, pregnancy, birth and puerperium (3.4%) and nutritious (1.7%) respectively. The third is *T. triandra* which is used to treat 9 disease symptoms groups. The leaf is crushed and applied to rashes to help treat skin diseases (21.3%), leaves are crushed to help treat hemorrhoids (19.1%). This includes boiling the stem and leaf to treat nutritious (13.8%), hypertension (11.7%), diabetes mellitus (9.6%), laxative (7.4%) gout (4.3%) and antitussis, cold and mucolytic (3.2%) respectively (Table 5 and Table 7).

Table 2. List of plant species with ethnobotanical uses by Isaan Laos ethnic groups, Khong Chai District, Kalasin Province, Thailand

Family	Scientific name	Thai name	Phenology (month)			Part used	Use categories	CI	Collector no.
			Flowering periods	Fruiting periods	Plant source				
Acanthaceae	<i>Andrographis paniculata</i> (Burm.f.) Wall. ex Nees	ฟ้าทะลายโจร	1-12	1-12	1, 2	RO, AS, LE, WP	ME	1.00	Pimtida001
	<i>Thunbergia laurifolia</i> Lindl.	รางจืด	1-2	3-4	1, 2	AS, LE	ME	0.78	Pimtida002
Alismataceae	<i>Butomopsis latifolia</i> (D.Don) Kunth	ผักพวย	6-8	8-10	1, 3	AS, LE	FS	1.00	Pimtida003
	<i>Limncharis flava</i> (L.) Buchenau	ก้านจอบ	9-11	11-12	1, 3	LE, FL	FS	1.00	Pimtida004
Amaranthaceae	<i>Amaranthus viridis</i> L.	ผักโขม	11-1	Not seen	2	WP	FS	1.00	Pimtida005
Amaryllidaceae	<i>Allium cepa</i> L.	ผักปลัง	11-12	Not seen	1	BU, LE, WP	FS,ME	1.26	Pimtida006
	<i>A. sativum</i> L.	กระเทียม	11-12	Not seen	1	BU, LE, WP	FS	1.00	Pimtida007
	<i>A. sp.</i>	ว่านพญาลิ้นงู	Not seen	Not seen	1	BU, LE, WP	ME	0.09	Pimtida008
	<i>A. tuberosum</i> Rottler ex Spreng.	ผักแป้น	11-12	Not seen	1	LE	FS	1.00	Pimtida009
Anacardiaceae	<i>Bouea macrophylla</i> Griff.	หมากปร่าง	11-12	1-2	1	FR	FS,ME	1.65	Pimtida010
	<i>Mangifera indica</i> L.	หมากม่วง	11-1	1-4	1	LE, FR, GU	FS,ME,PP	3.00	Pimtida011
	<i>Schinus terebinthifolia</i> Raddi	มะขุมมาเล	1-12	1-12	1	AS, LE, AP	FS	0.78	Pimtida012
	<i>Spondias pinnata</i> (L.f.) Kurz	หมากมะกอก	4-6	7-9	1, 2	RO, LE, FR, SE	FS,ME	1.26	Pimtida013
Annonaceae	<i>Annona squamosa</i> L.	หมากเขียบ	3-5	6-9	1	RO, LE, FR	FS,ME	1.78	Pimtida014
	<i>Melodorum fruticosum</i> Lour.	ลำควน	2-3	5-7	1	FL, WP	BR,OP	1.22	Pimtida015
	<i>Uvaria littoralis</i> (Blume) Blume	หมากคี่หัว	3-4	6-7	2	AS, LE, AP	FS	1.00	Pimtida016
Apiaceae	<i>Apium graveolens</i> L.	ขึ้นฉ่าย	Not seen	Not seen	1	AS, LE	FS	1.00	Pimtida017
	<i>Centella asiatica</i> (L.) Urb.	ผักหนอก	6-10	Not seen	1	AS, LE, AP	FS,ME	2.00	Pimtida018
	<i>Coriandrum sativum</i> L.	ชีลาว	1-12	Not seen	1	AS, LE, AP, WP	FS	1.00	Pimtida019
	<i>Eryngium foetidum</i> L.	หอมเป	1-12	Not seen	1	LE	FS	1.00	Pimtida020
	<i>Trachyspermum ammi</i> (L.) Sprague	ชีหอม	1-12	Not seen	1	AS, LE, AP, WP	FS	1.00	Pimtida021
Apocynaceae	<i>Adenium obesum</i> (Forssk.) Roem. & Schult.	ชวนชม	1-12	1-12	1	WP	OP	0.65	Pimtida022
	<i>Allamanda cathartica</i> L.	บานบุรี	1-12	Not seen	1	WP	OP	1.00	Pimtida023
	<i>Calotropis gigantea</i> (L.) Dryand.	ดอกกรัก	1-12	1-12	1, 2	FL, WP	OP,BR	1.74	Pimtida024
	<i>Carissa carandas</i> L.	หมากม่วงหาวมะนาวโห่	1-12	1-12	1	FR	FS,DR,ME	2.78	Pimtida025
	<i>Cascabela thevetia</i> (L.) Lippold	ลำพวย	1-12	Not seen	1, 2	WP	BR,OP	0.30	Pimtida026
	<i>Catharanthus roseus</i> (L.) G.Don	แพงพวย	11-1	Not seen	1	WP	OP	0.43	Pimtida027
	<i>Dischidia nummularia</i> R.Br.	เกล็ดเงินเกล็ดทอง	Not seen	Not seen	1	WP	BR,OP	0.78	Pimtida028
	<i>Plumeria obtusa</i> L.	ลีลาวดี	1-12	Not seen	1	WP	BR,OP	1.39	Pimtida029
	<i>Tabernaemontana divaricata</i> (L.) R.Br. ex Roem. & Schult.	พุดขาววัง	1-12	Not seen	1	FL, WP	BR,OP	1.87	Pimtida030
	<i>Wrightia religiosa</i> (Teijsm. & Binn.) Benth. ex Kurz	โมกพวง	1-12	Not seen	1	WP	OP	0.57	Pimtida031
Araceae	<i>Colocasia esculenta</i> (L.) Schott	เผือก	Not seen	Not seen	1, 2	CO	FS	2.00	Pimtida032
	<i>Alocasia sanderiana</i> W.Bull	แก้วสารพัดนึก	Not seen	Not seen	1	WP	OP	0.57	Pimtida033
	<i>A. cucullata</i> (Lour.) G.Don	นางกวัก	Not seen	Not seen	1	WP	BR,OP	1.43	Pimtida034
	<i>Amorphophallus brevispathus</i> Gagnep.	ธีรอก	6-7	Not seen	2	AS, LE	FS,PP	2.00	Pimtida035
	<i>Caladium bicolor</i> (Aiton) Vent.	บอนสี	6-8	Not seen	1	WP	OP	0.57	Pimtida036

	<i>Dieffenbachia alexiadesii</i> Croat	เศรษฐีวิลสัน	Not seen	Not seen	1	WP	OP	0.96	Pimtida037
	<i>Epipremnum aureum</i> (Linden & André) G.S.Bunting	พลูด่าง	Not seen	Not seen	1	WP	OP	0.61	Pimtida038
	<i>Homalomena rubescens</i> (Roxb.) Kunth	เสน่ห์จันทร์แดง	5-6	Not seen	1	WP	OP	0.70	Pimtida039
	<i>Lasia spinosa</i> (L.) Thwaites	ผักหนาม	5-6	Not seen	1, 3	AS, LE	FS	1.00	Pimtida040
	<i>Leucocasia gigantea</i> (Blume) Schott	บอน	Not seen	Not seen	1	AS, LE	FS	1.00	Pimtida041
	<i>Monstera deliciosa</i> Liebm.	พลูดอก	Not seen	Not seen	1	WP	OP	1.00	Pimtida042
	<i>Philodendron billietiae</i> Croat	ฟีโกลเดนดรอนก้านส้ม	Not seen	Not seen	1	WP	OP	0.57	Pimtida043
	<i>Wolffia globosa</i> (Roxb.) Hartog & Plas	ไข่เต่า	Not seen	Not seen	3	WP	FS	0.87	Pimtida044
	<i>Zamioculcas zamiifolia</i> (Lodd.) Engl.	กวักมรกต	4-5	Not seen	1	WP	OP	1.00	Pimtida045
Areaceae	<i>Adonidia merrillii</i> (Becc.) Becc.	หมากทวน	3-4	5-6	1	WP	OP	0.30	Pimtida046
	<i>Areca catechu</i> L.	หมาก	5-6	7-9	1	AS, LE, FR, SE	ME,CM,BR	2.43	Pimtida047
	<i>Borassus flabellifer</i> L.	ตาล	2-5	5-9	2	AS, SW, LE, SE	DA,CM	2.00	Pimtida048
	<i>Calamus viminalis</i> Willd.	หวาย	10-1	1-5	1	RO, AS, AP	FS,ME,CM	2.17	Pimtida049
	<i>Chamaedorea seifrizii</i> Burret	ปารเมไต์	Not seen	Not seen	1	WP	OP	0.43	Pimtida050
	<i>Cocos nucifera</i> L.	มะพร้าว	1-12	1-12	1	RO, AS, BA, LE, SE	FS,DR,ME,BR	3.09	Pimtida051
	<i>Elaeis guineensis</i> Jacq.	ปาล์มน้ำมัน	1-12	1-12	1	FR, SE, WP	OP	0.17	Pimtida052
	<i>Hydrocotyle umbellata</i> L.	ผักแว่นแก้ว	1-12	1-12	1, 3	AS, LE, AP	FS	1.00	Pimtida053
	<i>Phoenix dactylifera</i> L.	อินทผาตัด	6-7	7-8	1	FR	FS,ME	1.26	Pimtida054
	<i>Schefflera actinophylla</i> (Endl.) Harms	หนวดปลาหมึก	3-7	Not seen	1	WP	OP	0.52	Pimtida055
	<i>Streptocaulon juvenas</i> (Lour.) Merr.	เครือสุคร	8-10	11-1	2	RO, AS, LE, GU, WP	ME	0.74	Pimtida056
Asparagaceae	<i>Chlorophytum comosum</i> (Thunb.) Jacques	เศรษฐีเรือนใบ	Not seen	Not seen	1	WP	OP,BR	1.74	Pimtida057
	<i>Dracaena angolensis</i> (Welw. ex Carrière)	งาช้าง	3-4	Not seen	1	WP	ME,OP	0.96	Pimtida062
	<i>D. cochinchinensis</i> (Lour.) S.C.Chen	จันทร์ผา	7-8	8-9	1	AS, LE	ME,OP	0.48	Pimtida058
	<i>D. braunii</i> Engl.	กวนอิม	Not seen	Not seen	1	WP	OP	0.65	Pimtida059
	<i>D. fragrans</i> (L.) Ker Gawl.	วาสนา	11-1	Not seen	1	WP	OP	0.61	Pimtida060
	<i>D. hyacinthoides</i> (L.) Mabb.	ลิ้นมังกร	3-4	Not seen	1	WP	ME,OP	0.26	Pimtida061
Asphodelaceae	<i>Aloe vera</i> (L.) Burm.f.	ว่านหางจระเข้	11-2	Not seen	1	LE, WP	ME,OP	2.00	Pimtida063
Asteraceae	<i>Acmella oleracea</i> (L.) R.K.Jansen	ผักคาด	1-12	1-12	1	RO, AS, LE, AP	FS,ME	1.09	Pimtida064
	<i>Blumea balsamifera</i> (L.) DC.	หนาด	10-2	Not seen	1	AS, LE	ME,BR	1.09	Pimtida065
	<i>Chromolaena odorata</i> (L.) R.M.King & H.Rob.	ฝรั่ง	11-1	11-1	2	LE	ME	1.00	Pimtida066
	<i>Gymnanthemum amygdalinum</i> (Delile) Sch.Bip.	หนานเฉาหย่วย	4-5	5-6	1	LE	ME	0.09	Pimtida067
	<i>Helianthus annuus</i> L.	ทานตะวัน	1-12	1-12	1	SE, WP	FS,PP,OP	2.52	Pimtida068
	<i>Lactuca sativa</i> L.	ผักสลัด	Not seen	Not seen	1	AS, LE, AP	FS	1.00	Pimtida069
	<i>Tagetes erecta</i> L.	ดาวเรือง	1-12	1-12	1	WP	OP,BR	1.57	Pimtida070
Basellaceae	<i>Basella alba</i> L.	ผักขี้	1-12	1-12	1	AS, LE	FS	1.00	Pimtida071
Bignoniaceae	<i>Dolichandrone serrulata</i> (Wall. ex DC.) Seem.	แคนา	3-6	6-8	1, 2	FL	FS,OP	1.17	Pimtida072
	<i>Millingtonia hortensis</i> L.f.	แกนของ	10-2	2-5	1, 2	RO, AS, BA, FL	ME,OP	0.43	Pimtida073
	<i>Oroxylum indicum</i> (L.) Kurz	บัลลังก์ฟ้า	3-7	8-10	1	AS, LE, AP, FL, FR, SE	FS,ME	1.43	Pimtida074
	<i>Tabebuia aurea</i> (Silva Manso) Benth. & Hook.f. ex S.Moore	ปรีชาธร	1-12	Not seen	1	WP	OP	0.35	Pimtida075
	<i>Tecoma stans</i> (L.) Juss. ex Kunth.	ทองอุไร	1-12	Not seen	1	WP	OP	0.43	Pimtida076
Brassicaceae	<i>Brassica juncea</i> (L.) Czern.	ผักกาดเขียว	Not seen	Not seen	1	AS, LE, AP, FL	FS	1.00	Pimtida077
	<i>B. rapa</i> L.	ผักกาดเขียวทรงหัว	Not seen	Not seen	1	AS, LE, AP	FS	1.00	Pimtida078
	<i>B. oleracea</i> L.	กะหล่ำปลี	Not seen	Not seen	1	AS, LE, AP	FS	1.00	Pimtida079
Bromeliaceae	<i>Ananas comosus</i> (L.) Merr.	หมากมณี	Not seen	Not seen	1	FR	FS,DR,OP	2.22	Pimtida080
	<i>Tillandsia usneoides</i> (L.) L.	เคราฤๅษี	Not seen	Not seen	1	AE, WP	OP	0.57	Pimtida081
Caricaceae	<i>Carica papaya</i> L.	หมากหูก	1-12	1-12	1	AS, LE, FR, GU	FS,ME,PP	3.00	Pimtida082

Cactaceae	<i>Cereus hexagonus</i> (L.) Mill.	กระบองเพชร	Not seen	Not seen	1	WP	OP	0.87	Pimtida083
	<i>Selenicereus undatus</i> (Haw.) D.R.Hunt	แก้วมังกร	1-12	1-12	1	FR, SE	FS	1.00	Pimtida084
Cannabaceae	<i>Cannabis sativa</i> L.	กัญชา	1-2	2-4	1	AS, LE	FS,DR,ME	1.35	Pimtida085
Cannaceae	<i>Canna indica</i> L.	พุทธรักษา	1-12	1-12	1	FL, WP	BR,OP	1.91	Pimtida086
Capparaceae	<i>Crateva adansonii</i> DC.	ผักกุ่ม	2-7	7-9	2	AS, LE	FS,ME	0.96	Pimtida087
Chrysobalanaceae	<i>Parinari anamensis</i> Hance	พอก	3-4	4-8	2	AS, HW	CM	0.78	Pimtida088
Cleomaceae	<i>Cleome gynandra</i> L.	ผักเสี้ยน	1-2	2-3	1, 2	AS, LE, AP	FS	1.00	Pimtida089
Clusiaceae	<i>Garcinia schomburgkiana</i> Pierre	มะคัง	12-3	4-5	1	FR	FS,ME	1.30	Pimtida090
	<i>G. cowa</i> Roxb. ex Choisy	ส้มโอมง	2-4	4-6	1, 2	AS, LE, AP	FS	1.00	Pimtida091
Combretaceae	<i>Combretum indicum</i> (L.) DeFilipps	เสี้ยนมือนาง	1-12	Not seen	1	WP	OP	0.74	Pimtida092
	<i>C. quadrangulare</i> Kurz	สะแกมา	2-3	3-5	2	AS, HW	FU,OP	0.74	Pimtida093
	<i>Terminalia chebula</i> Retz.	หมากส้มมอ	4-5	10-11	1	FR	FS,ME	1.04	Pimtida094
Commelinaceae	<i>Tradescantia spathacea</i> Sw.	กานหอยเครง	1-12	Not seen	1	WP	OP	0.61	Pimtida095
Convolvulaceae	<i>Ipomoea aquatica</i> Forssk.	ผักนึ่ง	8-12	11-1	1, 3	AS, LE	FS	1.00	Pimtida096
Costaceae	<i>Costus woodsonii</i> Maas	เอื้องหมาขานาดอกแดง	5-9	Not seen	1	WP	OP	0.91	Pimtida097
	<i>Hellenia speciosa</i> (J.Koenig) S.R.Dutta	อีเอื้อง	6-8	8-12	2	RO, RH, LE, WP	FS,ME,OP	1.35	Pimtida098
Crassulaceae	<i>Kalanchoe daigremontiana</i> Raym.-Hamet & H. Perrier	เศรษฐีพันล้าน	Not seen	Not seen	1	WP	OP	0.74	Pimtida099
Cucurbitaceae	<i>Benincasa hispida</i> (Thunb.) Cogn.	หมากศึก	1-12	1-12	1	FR, SE	FS,PP	1.43	Pimtida100
	<i>Citrullus lanatus</i> (Thunb.) Matsum. & Nakai	หมากแดงโม	1-12	1-12	1	FR, SE	FS,DR	2.00	Pimtida101
	<i>Coccinia grandis</i> (L.) Voigt	ผักค่านิน	1-12	1-12	2	AS, LE, AP	FS	1.00	Pimtida102
	<i>Cucumis sativus</i> L.	บักเตง	1-12	1-12	1	FR, SE	FS	1.00	Pimtida103
	<i>C. melo</i> L.	แตงไทย	1-12	1-12	1	FR, SE	FS	1.00	Pimtida104
	<i>Cucurbita moschata</i> Duchesne	หมากอี	1-12	1-12	1	AS, AP, FR, SE	FS,PP	1.43	Pimtida105
	<i>Luffa acutangula</i> (L.) Roxb.	หมากบวมเหลี่ยม	1-12	1-12	1	AS, LE, AP, FR, SE	FS	1.00	Pimtida106
	<i>L. cylindrica</i> (L.) M.Roem.	หมากบวม	1-12	1-12	1	AS, LE, AP, FR, SE	FS	1.00	Pimtida107
	<i>Lagenaria siceraria</i> (Molina) Standl.	หมากน้ำเต้า	1-12	1-12	1	FR, SE	FS	1.00	Pimtida108
	<i>Momordica charantia</i> L.	ผักไซ	1-12	1-12	1	AS, LE, AP, FR, SE	FS,ME	1.48	Pimtida109
	<i>Momordica cochinchinensis</i> (Lour.) Spreng.	ผักข้าว	1-12	1-12	1	RO, AS, LE, AP, FR, SE	FS,ME	1.48	Pimtida110
	<i>Trichosanthes cucumerina</i> subsp. cucumerina	หมากโง้งเขียว	1-12	1-12	1	FR, SE	FS	1.00	Pimtida111
Cyatheaceae	<i>Cyathea gigantea</i> (Wall. Ex Hook.) Holtt.	เฟิร์น	Not seen	Not seen	1	WP	OP	0.26	Pimtida112
Cyperaceae	<i>Actinoscirpus grossus</i> (L.f.) Goetgh. & D.A.Simpson	กกสามเหลี่ยมใหญ่	5-8	Not seen	3	RO, AS, SW	ME,CM	0.48	Pimtida113
	<i>Cyperus alternifolius</i> subsp. flabelliformis Kuk.	กก	5-8	Not seen	1, 2	AS, SW	CM	1.00	Pimtida114
Dioscoreaceae	<i>Dioscorea esculenta</i> (Lour.) Burkill	มันเลือดนก	6-8	8-11	2	TU	FS,PP	2.00	Pimtida115
	<i>D. hispida</i> Dennst.	กลอย	6-8	8-11	2	CO	FS,PP	2.00	Pimtida116
	<i>D. inopinata</i> Prain & Burkill	มันเล็บช้าง	6-8	8-11	2	CO	FS,PP	2.00	Pimtida117
Dipterocarpaceae	<i>Dipterocarpus alatus</i> Roxb. ex G.Don	ยางนา	12-2	3-5	2	AS, HW, GU	CM	2.00	Pimtida118
	<i>D. intricatus</i> Dyer	ชาด	11-1	2-5	2	AS, HE, GU	CM,FU	2.00	Pimtida119
	<i>D. obtusifolius</i> Teijsm. ex Miq.	สะเบียง	1-2	2-5	2	AS, HE, GU	CM,FU	2.00	Pimtida120
	<i>D. tuberculatus</i> Roxb.	กุง	12-1	1-2	2	AS, HW, LE	CM,FU	2.00	Pimtida121
	<i>Shorea roxburghii</i> G.Don	พยอม	12-2	1-3	2	AS, HW	CM,FU	1.48	Pimtida122
Ebenaceae	<i>Diospyros ebenum</i> J.Koenig	หมากโก	3-4	4-6	2	AS, HW, BA, FR, SE	FS,ME,CM	2.30	Pimtida123
	<i>D. mollis</i> (Kurz) Gürke	หมากเกลือ	3-5	6-9	2	AS, HW, BA, FR	ME,DP, CM,FU	2.83	Pimtida124
Elaeocarpaceae	<i>Elaeocarpus hygrophilus</i> Kurz	หมากกอกน้ำ	4-6	7-9	1	FR	FS	1.00	Pimtida125
Euphorbiaceae	<i>Acalypha indica</i> L.	ตำเขเมว	7-12	7-12	1	RO, LE, WP	ME	1.61	Pimtida126
	<i>Cnidioscolus aconitifolius</i> (Mill.) I.M.Johnst.	ผักผงชูรส	1-12	Not seen	1	LE, AP	FS	2.00	Pimtida127
	<i>Euphorbia milii</i> Des Moul.	โป๊ยเซียน	1-12	Not seen	1	WP	OP	0.26	Pimtida128

	<i>E. tirucalli</i> L.	สามพันกึ่ง	9-10	Not seen	1	AS, LE, WP	ME,OP	0.17	Pimtida129
	<i>Jatropha curcas</i> L.	สมุนไพร	5-7	7-9	2	RO, AS, LE, GU	ME	0.96	Pimtida130
	<i>J. gossypifolia</i> L.	สมุนไพร	5-7	7-9	2	RO, AS, LE, SE, GU	ME	0.96	Pimtida131
	<i>Manihot esculenta</i> Crantz	มันสำปะหลัง	Not seen	Not seen	1	RO	FS,PP	0.09	Pimtida132
Fabaceae	<i>Acacia mangium</i> Willd.	กระถินเทพา	5-6	7-9	2	AS, HW	CM,FU	1.65	Pimtida133
	<i>A. pennata</i> (L.) Willd.	ฝักเขา	Not seen	Not seen	1	AS, LE, SE	FS	1.00	Pimtida134
	<i>Adenanthera pavonina</i> L.	บักหาล้า	2-4	5-7	1, 2	AS, LE, AP, SE	FS	0.91	Pimtida135
	<i>Azelia xylocarpa</i> (Kurz) Craib	มะค่าโมง	7-9	9-12	2	AS, HW	CM,FU	1.22	Pimtida136
	<i>Butea monosperma</i> (Lam.) Kuntze	จาน	2-3	3-5	2	AS, HW, LE	FU	0.48	Pimtida137
	<i>Caesalpinia pulcherrima</i> (L.) Sw.	หางนกยูงไทย	3-6	6-9	1	WP	OP	1.00	Pimtida138
	<i>Cassia bakeriana</i> Craib	กัณปพฤกษ์	2-4	4-7	1	WP	FU,OP	1.00	Pimtida139
	<i>C. fistula</i> L.	ถูน	2-6	8-9	1, 2	AS, HW, BALE, FL	ME,CM,BR,OP	2.13	Pimtida140
	<i>Clitoria ternatea</i> L.	อัญชัน	1-12	1-12	1, 2	FL	FS,DR,OP	2.87	Pimtida141
	<i>Dalbergia cochinchinensis</i> Pierre	พุง	5-7	6-8	2	AS, HW	CM,FU	1.74	Pimtida142
	<i>Lablab purpureus</i> subsp. <i>purpureus</i>	ถั่วเปบ	1-12	1-12	1	FR, SE	FS	1.00	Pimtida143
	<i>Leucaena leucocephala</i> (Lam.) de Wit	ฝักกระแตใหญ่	1-12	1-12	2	AS, LE, AP, FR, SE	FS,FU	1.22	Pimtida144
	<i>L. leucocephala</i> subsp. <i>glabrata</i> (Rose) Zarate	ฝักกระแตน้อย	1-12	1-12	2	AS, LE, AP, FR, SE	FS,FU	1.22	Pimtida145
	<i>Lysiphllum strychnifolium</i> (Craib) A.Schmitz	ข่านางแดง	5-8	5-8	1, 2	AS, LE	ME	0.26	Pimtida146
	<i>Mucuna pruriens</i> (L.) DC.	หมากมูข	11-12	12-1	2	SE	FS,PP	2.00	Pimtida147
	<i>Mimosa pigra</i> var. <i>asperata</i> (L.) Zarucchi, Vincent & Gandhi	ไมยราบยักษ์	1-12	1-12	3	AS, SW	CM	0.83	Pimtida148
	<i>Neptunia oleracea</i> Lour.	ฝักกระแตน้ำ	1-12	1-12	3	AS, LE, AP	FS	1.00	Pimtida149
	<i>Peltophorum dasyrrhachis</i> (Miq.) Kurz	อะลาง	2-4	5-9	2	AS, HW	CM	2.00	Pimtida150
	<i>Phanera sirindhorniae</i> (K.Larsen & S.S.Larsen) Mackinder & R.Clark	ว่านประดง	5-9	Not seen	2	AS	ME	0.09	Pimtida151
	<i>Pithecellobium dulce</i> (Roxb.) Benth.	หมากขามเทศ	10-12	12-4	1, 2	FR	FS	1.00	Pimtida152
	<i>Pterocarpus macrocarpus</i> Kurz	ประดู่	3-4	4-6	2	AS, BA, HW	DP,CM,FU	2.30	Pimtida153
	<i>Psophocarpus tetragonolobus</i> (L.) DC.	ถั่วพุด	10-11	11-12	1	FR, SE	FS	1.00	Pimtida154
	<i>Samanea saman</i> (Jacq.) Merr.	จามจุรี	8-9	10-12	2	AS, HW	CM,FU	2.00	Pimtida155
	<i>Senna alata</i> (L.) Roxb.	ซุมเห็ดเทศ	10-12	12-2	2	AS, LE, FL	ME	0.91	Pimtida156
	<i>S. garrettiana</i> (Craib) H.S.Irwin & Barneby	ซึ่เหล็กสาร	1-3	3-5	2	AS, HE, LE, AP, FL	FS,ME,DO,CM,FU	2.96	Pimtida157
	<i>S. siamea</i> (Lam.) H.S.Irwin & Barneby	ซึ่เหล็ก	1-3	3-5	2	AS, HW, LE, AP, FL	FS,ME,DP,CM,FU	3.39	Pimtida158
	<i>Sesbania grandiflora</i> (L.) Poir.	แคบ้าน	1-12	1-12	1	AS, BA, LE, AP, FL, FR, SE, GU	FS	1.00	Pimtida159
	<i>Sindora siamensis</i> Miq.	มะค่าแต้	3-6	6-9	2	AS, HW	CM,FU	1.43	Pimtida160
	<i>Tamarindus indica</i> L.	หมากขาม	8-11	10-12	2	AS, HW, LE, AP, FL, FR, SE, WP	FS,ME, CM,FU	2.43	Pimtida161
	<i>Vigna unguiculata</i> subsp. <i>sesquipedalis</i> (L.) Verdc.	ถั่วฝักยาว	1-12	1-12	1	AS, LE, AP, FR, SE	FS	1.00	Pimtida162
	<i>V. unguiculata</i> (L.) Walp.	ถั่วฝัก	1-12	1-12	1	AS, LE, AP, FR, SE	FS	1.00	Pimtida163
	<i>Xylocarpa</i> var. <i>xylocarpa</i>	แดง	2-4	5-9	2	AS, HW	CM	1.00	Pimtida164
Gentianaceae	<i>Cyrtophyllum fragrans</i> (Roxb.) DC.	มันปลา	4-6	Not seen	1, 2	AS, BA, LE, FL, WP	ME,CM,OP	0.61	Pimtida165
Hydrocharitaceae	<i>Ottelia alismoides</i> (L.) Pers.	ผักโสมอบ	Not seen	Not seen	3	AS, LE	FS	1.00	Pimtida166
Hypericaceae	<i>Cratoxylum formosum</i> (Jacq.) Benth. & Hook.f. ex Dyer	ผักคัตว	1-4	Not seen	1, 2	AS, LE, AP	FS	1.00	Pimtida167
Iridaceae	<i>Iris domestica</i> (L.) Goldblatt & Mabb.	ว่านหางห้าง	7-9	Not seen	1	RO, LE, FLWP	ME	0.09	Pimtida168
	<i>Sisyrinchium palmifolium</i> L.	หอมแดงพม่า	Not seen	Not seen	1	RO, BU, LE, WP	ME	0.13	Pimtida169
Irvingiaceae	<i>Irvingia malayana</i> Oliv. ex A.W.Benn.	หมากบก	1-3	2-4	2	AS, HW, FR	FS,FU	1.43	Pimtida170
Lamiaceae	<i>Coleus amboinicus</i> Lour.	หูเสือ	5-8	Not seen	1	AS, LE, AP	FS,ME	1.13	Pimtida171

	<i>Mentha × villosa</i> Huds.	สะระแหน่	Not seen	Not seen	1	AS, LE, AP	FS,BR	1.39	Pimtida172
	<i>Ocimum × africanum</i> Lour.	ผักอีดู่	1-12	1-12	1	RO, AS, LE, AP, FL	FS,ME	1.09	Pimtida173
	<i>O. basilicum</i> L.	โหระพา	1-12	1-12	1	AS, LE, AP	FS	1.00	Pimtida174
	<i>O. tenuiflorum</i> L.	ผักอีดู่ไทย	1-12	1-12	1	LE, AP, FL	FS	1.00	Pimtida175
	<i>Orthosiphon aristatus</i> (Blume) Miq.	หนวดแมว	9-10	10-11	1	RO, AS, LE, WP	ME	0.09	Pimtida176
	<i>Tectona grandis</i> L.f.	สักทอง	6-8	8-10	1	AS, HW	CM,FU	2.00	Pimtida177
Lauraceae	<i>Persea americana</i> Mill.	อาโวกาโด	9-12	12-1	1	FR	FS,DR	1.17	Pimtida178
Lecythidaceae	<i>Barringtonia acutangula</i> (L.) Gaertn.	กระโดนน้ำ	11-1	6-7	1, 2	LE, AP	FS	1.00	Pimtida179
	<i>Careya arborea</i> Roxb.	กระโดนบก	2-4	3-6	1, 2	LE, AP	FS	1.00	Pimtida180
Lythraceae	<i>Lagerstroemia calyculata</i> Kurz	อินทนิลน้ำ คั่นเปือย	3-6	6-9	1, 2	AS, HW, WP	FU,OP	0.52	Pimtida181
	<i>L. speciosa</i> (L.) Pers.	อินทนิลบก	3-6	6-9	1, 2	AS, HW, WP	FU,OP	0.57	Pimtida182
	<i>Punica granatum</i> L.	หมากพิลา	5-7	7-9	1	FR, SE	FS	1.00	Pimtida183
Malvaceae	<i>Ceiba pentandra</i> (L.) Gaertn.	จิ้ง	2-3	2-5	1, 2	RO, BA, LE, FR, SE, FI	ME,AA,FU	3.00	Pimtida184
	<i>Cullenia ceylanica</i> (Gardner) Wight ex K.Schum.	ทุเรียนหมอนทอง	11-1	1-6	1	FR	FS	1.00	Pimtida185
	<i>Gossypium herbaceum</i> subsp. <i>herbaceum</i>	ฝ้าย	7-9	9-11	1, 2	FI	AA,CM,FU	2.00	Pimtida186
Marsileaceae	<i>Marsilea minuta</i> var. <i>minuta</i>	ผักแว่น	2-6	6-9	3	AS, LE, AP	FS	1.00	Pimtida187
Meliaceae	<i>Azadirachta indica</i> A.Juss.	สะเดา	12-3	3-5	2	AS, LE, AP, FL	FS,ME,CM	1.61	Pimtida188
	<i>Sandoricum koetjape</i> (Burm.f.) Merr.	หมากค้อง	12-3	3-5	1	FR	FS,ME	2.00	Pimtida189
Menispermaceae	<i>Cissampelos pareira</i> L.	หมาน้อย	3-10	10-2	2	LE	FS	0.78	Pimtida190
	<i>Tinospora crispa</i> (L.) Hook. f. & Thomson	เครือกอสอ	1-5	4-5	2	AS, LE	ME	0.57	Pimtida191
	<i>T. triandra</i> (Colebr.) Diels	ช่านาง	3-4	Not seen	1, 2	AS, LE	FS,DR,ME	2.09	Pimtida192
Molluginaceae	<i>Glinus oppositifolius</i> (L.) Aug.DC.	ผักก้นขม	3-4	4-5	2	WP	FS	0.83	Pimtida193
Moraceae	<i>Artocarpus heterophyllus</i> Lam.	หมากขี้	11-12	1-5	1	RO, LE, FR, SE	FS,CM,BR	2.13	Pimtida194
	<i>A. lacucha</i> Buch.-Ham.	มะหาด	2-4	3-5	2	AS, HW, BA, FR	FS,ME	0.39	Pimtida195
	<i>Ficus microcarpa</i> L.f.	ไทรยอดทอง	Not seen	Not seen	1	WP	OP	0.61	Pimtida196
	<i>F. religiosa</i> L.	โพธิ์	Not seen	Not seen	1, 2	WP	BR,OP	1.17	Pimtida197
	<i>Morus alba</i> L.	หมากมอน	1-3	3-5	1	LE, FR, SE	FS,ME, DR	2.70	Pimtida198
	<i>Streblus asper</i> Lour.	ข่อย	1-2	2-4	2	AS, SW	CM,OP	0.96	Pimtida199
Moringaceae	<i>Moringa oleifera</i> Lam.	ผักอีหุม	11-1	1-4	2	AS, LE, FR, SE	FS,ME	2.00	Pimtida200
Muntingiaceae	<i>Muntingia calabura</i> L.	คะขบ	10-12	12-4	1	FR, SE	FS	1.00	Pimtida201
Musaceae	<i>Ensete bruce</i> ex Horan.	กล้วยขนาน	1-12	1-12	1	LE, FR	FS,OP	1.61	Pimtida202
	<i>Musa acuminata</i> Colla	กล้วยหอม	1-12	1-12	1	LE, FR	FS,DR	1.39	Pimtida203
	<i>M. paradisiaca</i> L.	กล้วยน้ำหว้า	1-12	1-12	1	AS, LE, FR	FS,ME	1.39	Pimtida204
	<i>M. ornata</i> Roxb.	กล้วยบัวสวรรค์	1-12	1-12	1	WP	OP	0.61	Pimtida205
Myrtaceae	<i>Eucalyptus × abdita</i> Brooker & Hopper	ยูคาลิปตัส	3-5	4-7	1	AS, HW	CM,FU,IC	2.35	Pimtida206
	<i>Psidium guajava</i> L.	หมากเสีดา	2-5	5-8	1, 2	LE, FR, SE	FS,ME	1.09	Pimtida207
	<i>Syzygium antisepticum</i> (Blume) Merr. & L.M.Perry	ผักเม็ก	2-4	4-6	1, 2	LE	FS	1.00	Pimtida208
	<i>S. cumini</i> (L.) Skeels	หาว	3-5	5-7	2	FR	FS,CM	0.78	Pimtida209
	<i>S. jambos</i> (L.) Alston	ชมพู	12-3	2-5	1	FR	FS	1.00	Pimtida210
Nelumbonaceae	<i>Nelumbo nucifera</i> Gaertn.	บัวหลวง	1-12	1-12	3	RH, AS, LE, SE	FS,ME,BR,IC	2.70	Pimtida211
Nyctaginaceae	<i>Bougainvillea buttiana</i> Holttum & Standl.	เฟื่องฟ้า	1-12	Not seen	1	WP	OP	0.74	Pimtida212
	<i>Mirabilis jalapa</i> L.	บานเย็น	1-12	1-12	1	WP	OP	1.00	Pimtida213
Nymphaeaceae	<i>Nymphaea pubescens</i> Willd.	บัวสาย	1-12	Not seen	3	AS	FS	1.00	Pimtida214
Oleaceae	<i>Jasminum sambac</i> (L.) Aiton	มะลิ	11-2	Not seen	1	FL, WP	BR,OP	2.00	Pimtida215
Opiliaceae	<i>Melientha suavis</i> Pierre	ผักหวาน	2-4	4-5	1, 2	AS, LE, AP	FS	1.00	Pimtida216
Orchidaceae	<i>Dendrobium</i> sp.	กล้วยไม้	11-4	2-5	1	AE, WP	OP	0.57	Pimtida217

Oxalidaceae	<i>Averrhoa bilimbi</i> L.	หมากตะลิงปลิง	11-2	2-4	1	LE, FR	FS,ME	2.00	Pimtida218
	<i>A. carambola</i> L.	หมากเงือก	1-12	1-12	1	AS, LE, AP, FR	FS,ME	1.87	Pimtida219
Pandanaceae	<i>Pandanus amaryllifolius</i> Roxb.	เคย	Not seen	Not seen	1	LE	FS,DR,ME,CP	3.30	Pimtida220
Passifloraceae	<i>Passiflora edulis</i> Sims	เสาวรส	6-8	8-1	1	FR, SE	FS,DR, ME	3.00	Pimtida221
	<i>P. foetida</i> L.	ผักอีชี๊ะ	6-7	7-9	2	RO, AS, LE, AP, FR, SE	FS,ME	2.00	Pimtida222
Pedaliaceae	<i>Sesamum indicum</i> L.	งาขาว	4-5	5-7	1	SE	FS	1.00	Pimtida223
Phyllanthaceae	<i>Antidesma puncticulatum</i> Miq.	หมากเฒ่า	3-5	5-8	1	FR, SE	FS,ME	1.09	Pimtida224
	<i>Hymenocardia punctata</i> Wall. ex Lindl.	บุลึง	4-6	Not seen	2	AS, HW	CM	0.26	Pimtida225
	<i>Phyllanthus acidus</i> (L.) Skeels	หมากขม	4-5	5-7	1	LE, FR, SE	FS,ME,BR	3.00	Pimtida226
	<i>P. emblica</i> L.	หมากขามบือม	8-11	11-1	1, 2	FR	FS,ME	2.00	Pimtida227
Piperaceae	<i>Peperomia pellucida</i> (L.) Kunth	กระสัง	6-8	Not seen	2	WP	ME	0.13	Pimtida228
	<i>Piper betle</i> L.	พญู	3-6	Not seen	1	LE, WP	ME,BR,OP	1.17	Pimtida229
	<i>P. longum</i> L.	ดีปลี	1-12	Not seen	1	RO, AS, LE, FL, FR, SE	ME	0.09	Pimtida230
	<i>P. sarmentosum</i> Roxb.	ผักอีเล็ด	3-6	5-9	1	LE, WP	FS,ME	1.43	Pimtida231
Plantaginaceae	<i>Limnophila geoffrayi</i> Bonati	ผักกะเขง	3-7	7-9	1, 3	WP	FS,ME	1.35	Pimtida232
Poaceae	<i>Bambusa beecheyana</i> Munro	ไผ่กิมชุง	Not seen	Not seen	1	RO, AS, SW, LE, SH	FS,ME,CM	2.87	Pimtida233
	<i>B. bambos</i> (L.) Voss.	ไผ่ป่า	Not seen	Not seen	1, 2	RO, AS, SW, LE, SH	FS,ME,CM	2.87	Pimtida234
	<i>B. multiplex</i> (Lour.) Raeusch. ex Schult.f.	ไผ่เลี้ยง	Not seen	Not seen	1	RO, AS, SW, LE, SH	FS,ME	2.87	Pimtida235
	<i>B. spinosa</i> Roxb.	ไผ่ขี้เหล็ก	Not seen	Not seen	1, 2	RO, AS, SW, LE, SH	FS,ME	2.87	Pimtida236
	<i>Cymbopogon citratus</i> (DC.) Stapf.	ตะไคร้	Not seen	Not seen	1	AS, LE, WP	FS,ME,CP,BR	2.48	Pimtida237
	<i>Imperata cylindrica</i> (L.) Raeusch.	หญ้าคา	Not seen	Not seen	2	LE	CM,BR	2.00	Pimtida238
	<i>Oryza sativa</i> L.	ข้าว	8-9	9-12	1	AS, LE, SE, WP	FS,DR,PP,BR,IC	4.74	Pimtida239
	<i>Saccharum officinarum</i> L.	อ้อย	Not seen	Not seen	1	AS, AP	FS,DR,BR	3.00	Pimtida240
	<i>S. sinense</i> Roxb.	อ้อยดำ	Not seen	Not seen	1	AS, AP, WP	ME,BR	1.09	Pimtida241
	<i>Zea mays</i> L.	ข้าวโพด	1-12	1-12	1	SE	FS,PP	2.00	Pimtida242
Polygonaceae	<i>Persicaria odorata</i> (Lour.) Sojak	ผักแห้ว	10-11	Not seen	1	AS, LE, AP	FS	1.00	Pimtida243
Pontederiaceae	<i>Pontederia crassipes</i> Mart.	ผักคตชวา	1-12	Not seen	3	AS, FL	FS,CM	1.13	Pimtida244
Portulacaceae	<i>Portulaca oleracea</i> L.	ลูกนายนต้นสาย	1-12	Not seen	1	WP	OP	1.00	Pimtida245
Primulaceae	<i>Ardisia polycephala</i> Wall. ex A.DC.	ผักตีนจ้ำ	6-7	7-9	1	LE, AP	FS	1.00	Pimtida246
Rhamnaceae	<i>Ziziphus jujuba</i> Mill.	พุทรา	4-6	6-9	2	FR	FS	1.00	Pimtida247
	<i>Z. oenopolia</i> (L.) Mill.	เสียบแมว	3-5	5-8	2	FR, SE	FS	1.00	Pimtida248
Rosaceae	<i>Rosa abietina</i> Gren. ex H.Christ	กุหลาบ	11-5	Not seen	1	FL, WP	OP	0.43	Pimtida249
Rubiaceae	<i>Ixora chinensis</i> Lam.	เข็ม	1-12	Not seen	1	WP	OP	0.87	Pimtida250
	<i>Mitragyna speciosa</i> Korth.	กระท่อมก้านแดง	Not seen	Not seen	1	LE	ME	0.35	Pimtida251
	<i>M. diversifolia</i> (Wall. ex G.Don) Havil.	ท่ม	11-12	3-4	2	RO, AS, BA, HW, LE	ME,CM,FU	0.87	Pimtida252
	<i>Morinda citrifolia</i> L.	ขอบ้าน	1-12	1-12	2	LE, FR	FS,BR	1.57	Pimtida253
	<i>M. coreia</i> Buch.-Ham.	ขอบป่า	4-7	5-8	2	RO, AS, LE	ME,DP,BR	1.17	Pimtida254
	<i>Mussaenda philippica</i> A.Rich.	คองญา	1-12	Not seen	1	WP	OP	0.57	Pimtida255
	<i>Paederia linearis</i> Hook.f.	เครือคตหมา	1-5	4-5	2	RO	FS	1.00	Pimtida256
Rutaceae	<i>C. aurantiifolia</i> (Christm.) Swingle	บักมะนาวแป้น	1-12	1-12	1	FR	FS,ME,DR	2.70	Pimtida257
	<i>C. hystrix</i> DC.	หมากกรูด	7-8	8-10	1	LE, FR, SE	FS,ME	2.74	Pimtida258
	<i>Citrus maxima</i> (Burm.) Merr.	ส้มโอ	4-7	7-8	1	FR	FS	1.00	Pimtida259
	<i>C. medica</i> L.	หมากเหมวอ	7-8	8-10	1	LE, FR	FS	1.00	Pimtida260
Sapindaceae	<i>Dimocarpus longan</i> Lour.	หมากลำไย	2-4	3-7	1	FR	FS,DR	2.00	Pimtida261
	<i>Litchi chinensis</i> Sonn.	หมากลิ้นจี่	12-2	1-4	1	FR	FS,DR	2.00	Pimtida262

	<i>Lepisanthes rubiginosa</i> (Roxb.) Leenh.	หมากหวดฆ่า	2-3	3-5	1	AS, LE, FR	FS,ME	0.87	Pimtida263
	<i>Schleichera oleosa</i> (Lour.) Oken	หมากคร้อ	3-4	4-7	2	FR	FS,ME	2.00	Pimtida264
Sapotaceae	<i>Manilkara zapota</i> (L.) P.Royen	ละมุด	1-12	1-12	1	FR	FS	1.00	Pimtida265
Saururaceae	<i>Houttuynia cordata</i> Thunb.	พุดขาว	6-7	7-8	1	RO, LE, WP	FS,ME	0.96	Pimtida266
Solanaceae	<i>Capsicum annuum</i> L.	พริก	1-12	1-12	1	RO, AS, LE, AP, FR, SE	FS,ME	1.09	Pimtida267
	<i>Lycopersicon esculentum</i> Mill.	หมากเขือเครือ	1-12	1-12	1	FR, SE	FS	1.00	Pimtida268
	<i>Nicotiana tabacum</i> L.	ยาสูบ	Not seen	Not seen	1	RO, LE	ME,BR	1.61	Pimtida269
	<i>Solanum aculeatissimum</i> Jacq.	หมากเขือขื่น	1-12	1-12	1	RO, FL, FR, SE	FS,ME,PP,BR	3.09	Pimtida270
	<i>S. lycopersicum</i> L.	หมากเขือเทศ	1-12	1-12	1	FR, SE	FS,ME,PP	2.22	Pimtida271
	<i>S. melongena</i> L.	หมากเขือยาว	1-12	1-12	1	FL, FR, SE	FS,PP,BR	3.00	Pimtida272
	<i>S. procumbens</i> Lour.	หมากเข็งขม	6-9	9-12	1	RO, FL, FR, SE	FS,ME,PP	2.74	Pimtida273
	<i>S. torvum</i> Sw.	หมากเข็ง	1-12	1-12	1	FL, FR, SE	FS,PP,BR	2.48	Pimtida274
	<i>S. stramonifolium</i> Jacq.	หมากอีก	3-4	4-7	1	FR, SE	FS,PP	2.00	Pimtida275
	<i>S. virginianum</i> L.	หมากเขือประาะ	1-12	1-12	1	FL, FR, SE	FS,PP,BR	3.00	Pimtida276
Stemonaceae	<i>Stemona tuberosa</i> var. <i>moluccana</i> (Blume) ined.	หนอนคายชาก	2-4	4-9	2	RO, LE	ME	0.09	Pimtida277
Strelitziaceae	<i>Ravenala madagascariensis</i> Sonn.	กล้วยพัด	1-12	Not seen	1	WP	OP	0.61	Pimtida278
Talinaceae	<i>Talinum paniculatum</i> (Jacq.) Gaertn.	โสมไทย	12-1	Not seen	1, 2	RO, LE, WP	ME	0.09	Pimtida279
Zingiberaceae	<i>Alpinia galanga</i> (L.) Willd.	ข่าบ้าน	4-9	7-10	1, 2	RH, LE, SH, FL	FS,ME	1.83	Pimtida280
	<i>Boesenbergia rotunda</i> (L.) Mansf.	กระชายขาว	6-9	Not seen	1	RO, RH, LE	FS,ME	2.00	Pimtida281
	<i>Curcuma longa</i> L.	ขมิ้น	6-9	8-10	1	RH, LE	FS,ME,DP,CP	3.26	Pimtida282
	<i>C. sessilis</i> Gage	กระเจียว	7-8	Not seen	1, 2	FL	FS	0.91	Pimtida283
	<i>Elettaria cardamomum</i> (L.) Maton	กระวาน	5-7	7-8	1, 2	RH, AS, LE	ME	0.09	Pimtida284
	<i>Globba winitii</i> C.H.Wright	เข้าพรรษา	6-9	9-11	1, 2	LE, FL	ME,BR,OP	1.30	Pimtida285
	<i>Hedychium coronarium</i> J.Koenig	สลด	6-12	Not seen	1	RH, FL, WP	BR,OP,ME	1.35	Pimtida286
	<i>Kaempferia parviflora</i> Wall. ex Baker	กระชายดำ	6-7	6-8	1	RO, RH, LE, WP	ME	0.70	Pimtida287
	<i>Stahliathus campanulatus</i> Kuntze.	ว่านดึกเห็ด	Not seen	Not seen	1, 2	RH, LE, WP	ME	0.35	Pimtida288
	<i>Zingiber montanum</i> (J.Koenig) Link ex A.Dietr.	ว่านไฟ	7-10	Not seen	1	RH, AS, LE, WP	FS,ME	2.00	Pimtida289
	<i>Z. officinale</i> Roscoe	ขิงน้อ	7-10	Not seen	1	RH, LE	FS,ME,OP	2.17	Pimtida290
	<i>Z. zerumbet</i> (L.) Roscoe ex Sm.	อิทธิ	6-10	Not seen	1, 2	RH, AS, LE, SH, LE	FS,ME	0.43	Pimtida291

Note: Plant source: 1: cultivated plants, 2: Wild plants, 3: Aquatic plants. 12 plant utilization aspects: AA: Aparent, BR: Beliefs and Rituals, CM: Construction and Materials, CP: Cosmetics and Perfumery, DP: Dye Plant, DR: Drink, FS: Food and Spices, FU: Fuel, IC: Industrial Crop, ME: Medicinal herbs, OP: Ornamental Plants, and PP: Poisonous Plant. Part used: AE: Aerial part, AP: Apical, AS: Aerial Stem, BA: Barks, BU: Bulb, CO: Corm, FI: Fiber, FL: Flower, FR: Fruit, GU: Gum, HW: Hard Wood, LE: Leaf, RH: Rhizome, RO: Root, SE: Seeds, SH: Shoots, SW: Soft Wood, and TU: Tuber

Table 3. Cultural Importance Index (CI) of the 20 most important plant species in the Isaan Laos ethnic groups

Scientific name	Food and spices	Drink	Medicinal herbs	Poisonous plant	Dye plant	Cosmetics and perfumery	Aparel	Construction and materials	Beliefs and rituals	Fuel	Ornamental plants	Industrial crop	CI
<i>Oryza sativa</i>	✓	✓	-	✓	-	-	-	-	✓	-	-	✓	4.74
<i>Senna siamea</i>	✓	-	✓	-	✓	-	-	✓	-	✓	-	-	3.39
<i>Pandanus amaryllifolius</i>	✓	✓	✓	-	-	✓	-	-	-	-	-	-	3.30
<i>Curcuma longa</i>	✓	-	✓	-	✓	✓	-	-	-	-	-	-	3.26
<i>Cocos nucifera</i>	✓	✓	✓	-	-	-	-	-	✓	-	-	-	3.09
<i>Solanum aculeatissimum</i>	✓	-	✓	✓	-	-	-	-	✓	-	-	-	3.09
<i>Phyllanthus acidus</i>	✓	-	✓	-	-	-	-	-	✓	-	-	-	3.00
<i>Carica papaya</i>	✓	-	✓	✓	-	-	-	-	-	-	-	-	3.00
<i>Solanum virginianum</i>	✓	-	-	✓	-	-	-	-	✓	-	-	-	3.00
<i>Solanum melongena</i>	✓	-	-	✓	-	-	-	-	✓	-	-	-	3.00
<i>Mangifera indica</i>	✓	-	✓	✓	-	-	-	-	-	-	-	-	3.00
<i>Saccharum officinarum</i>	✓	✓	-	-	-	-	-	-	✓	-	-	-	3.00
<i>Passiflora edulis</i>	✓	✓	✓	-	-	-	-	-	-	-	-	-	3.00
<i>Gossypium herbaceum</i>	-	-	-	-	-	-	✓	✓	-	✓	-	-	3.00
<i>Senna garrettiana</i>	✓	-	✓	-	-	-	-	✓	-	✓	-	-	2.96
<i>Bambusa multiplex</i>	✓	-	✓	-	-	-	-	✓	-	-	-	-	2.87
<i>Bambusa spinosa</i>	✓	-	✓	-	-	-	-	✓	-	-	-	-	2.87
<i>Clitoria ternatea</i>	✓	✓	-	-	-	-	-	-	-	-	✓	-	2.87
<i>Bambusa beecheyana</i>	✓	-	✓	-	-	-	-	✓	-	-	-	-	2.87
<i>Bambusa bambos</i>	✓	-	✓	-	-	-	-	✓	-	-	-	-	2.87

Table 4. Medical/ailment categories and Informant Agreement Ration (IAR) of medicinal plants used by Isaan Laos ethnic group

Medical category	Number of use-report	Number of species	IAR
Body aches	65	5	0.94
Laxative	561	41	0.93
Dizziness	75	7	0.92
Skin disease	462	42	0.91
Wounds and injuries	423	39	0.91
Flatulence and expel wind	419	43	0.90
Insect bites	177	21	0.89
Antitussis, cold, mucolytic	381	45	0.88
Hemorrhoid	163	21	0.88
Anthelmintic	203	27	0.87
Hypertension	170	28	0.84
Female, pregnancy, birth and puerperium	100	17	0.84
Cancer	97	17	0.83
Heart disease	87	16	0.83
Nutritious	188	35	0.82
Diabetes mellitus	66	14	0.80
Gout	6	2	0.80
Diuretic	122	26	0.79
Tuberculosis	8	3	0.71
Potency	16	6	0.67

In a study conducted by Phatlamphu et al. (2021), it was observed that two folk healers and their patients utilized 68 edible plants, which accounted for 48.22% of the total edible species in the study area. These plants were used as traditional medical treatments to treat various ailments and symptoms. In the study conducted by

Pholhiamhan et al. (2018), it was discovered that a total of 51 plant species were utilized for the treatment of digestive system diseases. Additionally, 27 plant species were shown to be effective in treating infections and infestations, while 20 plant species were used for the treatment of injuries. The injuries were the highest ICF value of 0.968. The plant species *C. asiaticum* var. *asiaticum* had the highest %FL of 93.62%, and it was consistently used for digestive system disorders. *Curcuma longa* had a %FL of 82.61, and *T. triandra* had a %FL of 71.37, as reported by Numpulsuksant et al. (2021). These plants were consistently used for pain and had the highest %FL of 50. The climber was primarily utilized for cultivating medicinal plants, with an IAR of 0.97. The people predominantly utilized the root (57.89%), leaf (52.63%), and fruit (39.47%) as the primary plant parts.

A study conducted by Junsongduang et al. (2021) recorded a total of 146 species belonging to 127 genera and 60 plant groups were identified for their therapeutic properties by the 14 traditional healers. The Fabaceae family had the highest number of medicinal plants, with 12 species, accounting for 8% of the total. This was followed by the Poaceae family, which had 9 species, making up 6% of the total, and the Zingiberaceae family, which had 8 species, accounting for 5% of the total. A team of 14 healers together utilized medicinal herbs to address a total of 53 specific ailments. Among the specific symptoms, itching had the highest IAR value of 0.33, based on 4 use-reports from 3 species. The digestive system disorders category had IAR value of 0.35, based on 57 use-reports from 37 species.

Table 5. Medical category, %FL, plant part used and mode of application of medicinal plants used by Isaan Laos ethnic group in Sadam Sri Village, Lamchi Sub-district, Khong Chai District, Kalasin Province, Thailand

Family	Scientific name	Thai name	Np	N	%FL	Part used	Mode of application	Medical category	
Acanthaceae	<i>Andrographis paniculata</i> (Burm.f.) Wall. ex Nees	ฟ้าทะลายโจร	14	52	26.9	Whole parts	Boiled to drink	Flatulence and expel wind	
			15	52	28.8	Leaf	Fresh leaf are crushed and applied to the skin	Skin disease	
	<i>Thunbergia laurifolia</i> Lindl.	รางจืด	23	52	44.2	Leaf	Boiled to drink	Antitussis, cold, mucolytic	
			12	75	16.0	Stem, leaf	Boiled to drink	Diabetes mellitus	
			17	75	22.7	Stem, leaf	Boiled to drink	Cancer	
			18	75	24.0	Leaf	Fresh leaf are crushed and applied to the skin	Skin disease	
			18	75	24.0	Leaf	Grind and apply to the wound	Wounds and injuries	
			10	75	13.3	Leaf	The leaves are boiled and sprayed to kill insects	Insect bites	
	Amaryllidaceae	<i>Allium cepa</i> L.	ศักรับ	2	20	10.0	Whole parts	Boiled to drink	Cancer
				3	20	15.0	Whole parts	Boiled to drink	Heart disease
5				20	25.0	Whole parts	Boiled to drink	Flatulence and expel wind	
6				20	30.0	Whole parts	Boiled to drink	Antitussis, cold, mucolytic	
4				20	20.0	Whole parts	Grind it to kill insects	Insect bites	
2				2	100.0	Whole parts	Grind it and apply it to cure snake venom	Insect bites	
Anacardiaceae	<i>Bouea macrophylla</i> Griff.	หมากปราง	15	15	100.0	Fruit	Fruits are eaten fresh	Flatulence and expel wind	
			23	23	100.0	Fruit	Fruits are eaten fresh	Laxative	
	<i>Mangifera indica</i> L.	หมากม่วง	2	20	10.0	Root	Boiled to drink	Diuretic	
			6	20	30.0	Fruit	Eat fresh	Flatulence and expel wind	
			6	20	30.0	Leaf, fruit	Eat fresh	Laxative	
	<i>Spondias pinnata</i> (L.f.) Kurz	หมากมะกอก	3	20	15.0	Leaf	Fresh leaf are crushed and applied to the skin	Skin disease	
			3	20	15.0	Leaf	Grind and apply to the wound	Wounds and injuries	
22			78	28.2	Fruit	Fresh leaf are crushed and applied to the skin	Skin disease		
12			78	15.4	Leaf	Boiled to drink	Wounds and injuries		
18			78	23.1	Root	Boiled to drink	Anthelmintic		
Annonaceae	<i>Annona squamosa</i> L.	หมากเขียบ	3	78	3.8	Root	Boiled to drink	Nutritious	
			23	78	29.5	Leaf	Boil it to get rid of insects that eat vegetables or grind it and apply it all over the head to kill lice	Insect bites	
			23	36	63.9	Stem, leaf	Grind and apply to the wound	Insect bites	
			13	36	36.1	Stem, leaf	Boiled or eaten raw, nourishes the blood	Wounds and injuries	
			5	84	6.0	Fruit	Fruits are eaten fresh	Female, pregnancy, birth and puerperium	
Apocynaceae	<i>Carissa carandas</i> L.	หมากม่วงหาวมะนาวโห่	20	84	23.8	Fruit	Fruits are eaten fresh	Diabetes mellitus	
			23	84	27.4	Fruit	Fruits are eaten fresh	Flatulence and expel wind	
			16	84	19.0	Fruit	Fruits are eaten fresh	Laxative	
			20	84	23.8	Fruit	Fruits are eaten fresh	Skin disease	
Arecaceae	<i>Areca catechu</i> L.	หมาก	7	27	25.9	Fruit, seeds	Grind and apply to the wound	Antitussis, cold, mucolytic	
			8	27	29.6	Fruit, seeds	Grind it and apply it to the skin	Skin disease	

			3	27	11.1	Fruit, seeds	Chew and eat	Wounds and injuries
			9	27	33.3	Fruit, seeds	Chew and eat	Antitussis, cold, mucolytic
	<i>Calamus viminalis</i> Willd.	หาวช	2	8	25.0	Root, apical	Boiled to drink	Anthelmintic
			2	8	25.0	Stem, apical	Used as food ingredient	Diuretic
			4	8	50.0	Root	Boiled to drink	Laxative
	<i>Cocos nucifera</i> L.	มะพร้าว	1	22	4.5	Root	Boiled to drink	Diabetes mellitus
			1	22	4.5	Root	Boiled to drink	Hyper tension
			5	22	22.7	Root	Eat the flesh inside the seed and drink the juice	Heart disease
			2	22	9.1	Barks	The bark of the trunk is burned to ashes and is used to treat the skin	Diuretic
			6	22	27.3	Seeds	Eat the flesh inside the seed and drink the juice	Skin disease
			7	22	4.5	Root	The water inside the seeds is good for stopping bleeding	Wounds and injuries
			5	22	22.7	Seeds	The water inside the seeds is taken for drinking	Anthelmintic
			1	22	4.5	Fruit	Apply the oil to the insect bites	Insect bites
	<i>Phoenix dactylifera</i> L.	อินทผาตัด	6	6	100.0	Fruit	Fruits are eaten fresh	Nutritious
	<i>Streptocaulon juventas</i> (Lour.) Merr.	เครือสุตร	4	40	10.0	Leaf	Boiled to drink	Hyper tension
			4	40	10.0	Gum	Boiled to drink	Laxative
			16	40	40.0	Root	The gum can treat mouth ulcers	Wounds and injuries
			8	40	20.0	Root	Boiled to drink	Antitussis, cold, mucolytic
			4	40	10.0	Root	Boiled to drink	Potency
			4	40	10.0	Root	Boiled to drink	Nutritious
Asparagaceae	<i>Dracaena angolensis</i> (Welw. ex Carrière)	งาช้าง	2	10	20.0	Stem, leaf	Boiled to drink	Hyper tension
			2	10	20.0	Leaf	Grind it and apply it to the skin	Hemorrhoid
			2	10	20.0	Stem, leaf	Boiled to drink	Diuretic
			2	10	20.0	Stem, leaf	Boiled to drink	Anthelmintic
			2	10	20.0	Stem, leaf	Boiled to drink	Nutritious
	<i>D. cochinchinensis</i> (Lour.) S.C.Chen	ชันชั่ง	2	5	40.0	Stem	Boiled to drink	Heart disease
			2	5	40.0	Stem	Fresh leaf are crushed and applied to the skin	Wounds and injuries
			1	5	20.0	Stem	Bring to a boil to drink	Antitussis, cold, mucolytic
	<i>D. hyacinthoides</i> (L.) Mabb.	ต้นมังกะ	4	4	100.0	Whole parts	Empty space in the bedroom helps absorb toxins	Antitussis, cold, mucolytic
Asphodelaceae	<i>Aloe vera</i> (L.) Burm.f.	ว่านหางจระเข้	24	48	50.0	Leaf	The leaves are gelatinous and can be applied to the skin from itchy rashes	Skin disease
			24	48	50.0	Leaf	The leaves are gelatinous and can be used to heal wounds	Wounds and injuries
Asteraceae	<i>Acmella oleracea</i> (L.) R.K.Jansen	ผักคาด	2	8	25.0	Leaf	Boiled to drink	Diuretic
			2	8	25.0	Leaf	Boil and drink or eat fresh	Flatulence and expel wind
			2	8	25.0	Leaf	Boil and drink or eat fresh	Laxative
			2	8	25.0	Leaf	Boil and drink or eat fresh	Antitussis, cold, mucolytic
	<i>Blumea balsamifera</i> (L.) DC.	หนาด	1	13	7.7	Stem	Boiled to drink	Hyper tension
			1	13	7.7	Fruit	Fruits are eaten fresh	Laxative
			1	13	7.7	Stem	Boil and drink for nourishment after giving birth	Female, pregnancy, birth and puerperium
			10	13	76.9	Stem, leaf	Boiled to drink	Nutritious

	<i>Chromolaena odorata</i> (L.) R.M.King & H.Rob.	ฝรั่ง	18	81	22.2	Leaf	Fresh leaf are crushed and applied to the skin	Hemorrhoid
			18	81	22.2	Leaf	Fresh leaf are crushed and applied to the skin	Skin disease
			23	81	28.4	Leaf	Fresh leaf are crushed and applied to the skin	Wounds and injuries
			22	81	27.2	Leaf	Use it to grind and apply compresses to wounds from insect bites	Insect bites
	<i>Gymnanthemum amygdalinum</i> (Delile) Sch.Bip.	หนานเฉาเหว่ย	2	4	50.0	Leaf	Boiled to drink	Hyper tension
Bignoniaceae	<i>Millingtonia hortensis</i> L.f.	แกนทอง	2	4	50.0	Leaf	Boiled to drink	Antitussis, cold, mucolytic
			3	13	23.1	Root	Boiled to drink	Hyper tension
			2	13	15.4	Barks, stem	Boiled to drink	Tuberculosis
			3	13	23.1	Barks	Boiled to drink	Hemorrhoid
			1	13	7.7	Barks, stem	Boiled to drink	Diuretic
			4	13	30.3	Barks, stem	Boiled to drink	Antitussis, cold, mucolytic
	<i>Oroxylum indicum</i> (L.) Kurz	หมากลิ้นฟ้า	5	19	26.3	Stem, leaf	Boil and drink or eat fresh	Diabetes mellitus
			2	19	10.5	Stem	Boiled to drink	Hyper tension
			6	19	31.6	Fruit, seeds	Boiled and eaten with chili paste	Flatulence and expel wind
			6	19	31.6	Fruit, seeds	Boil it or eat it fresh	Anthelmintic
Caricaceae	<i>Carica papaya</i> L.	หมากหุ่ง	17	92	18.5	Fruit	Fruitsare eaten fresh	Cancer
			21	92	22.8	Fruit	Fruitsare eaten fresh	Flatulence and expel wind
			14	92	15.2	Fruit	Eating ripe fruit helps nourish the skin	Skin disease
			19	92	20.7	Leaf	Grind and apply to the wound	Wounds and injuries
			21	92	22.8	Leaf, gum	Grind and apply to cure animal poisons	Insect bites
Cannabaceae	<i>Cannabis sativa</i> L.	กัญชา	2	10	20.0	Leaf	Boiled to drink	Cancer
			8	10	80.0	Leaf	Boiled to drink	Nutritious
Capparaceae	<i>Crateva adansonii</i> DC.	ผักกุ่ม	2	6	33.3	Leaf	Boiled to drink	Heart disease
			4	6	66.7	Stem, leaf	Boiled to drink	Nutritious
Clusiaceae	<i>Garcinia schomburgkiana</i> Pierre	หมากดั้น	18	18	100.0	Fruit	Fruitsare eaten fresh	Laxative
	<i>Terminalia chebula</i> Retz.	หมากส้มมอ	5	69	7.2	Fruit	Boil and drink or eat fresh	Hyper tension
			20	69	29.0	Fruit	Eat fresh	Flatulence and expel wind
			18	69	26.1	Fruit	Eat fresh	Laxative
			17	69	24.6	Fruit	Eat fresh	Antitussis, cold, mucolytic
			9	69	13.0	Fruit	Boil and drink or eat fresh	Nutritious
Costaceae	<i>Hellenia speciosa</i> (J.Koenig) S.R.Dutta	อีอ็อง	2	6	33.3	Rhizome	Boiled to drink	Diuretic
			4	6	66.7	Leaf	Fresh leaf are crushed and applied to the skin	Wounds and injuries
Cucurbitaceae	<i>Momordica charantia</i> L.	ผักไซ	6	60	10.0	Leaf, fruit, seeds	Boiled or eaten raw	Diabetes mellitus
			7	60	11.7	Leaf	Boiled to drink	Hemorrhoid
			9	60	15.0	Leaf, fruit, seeds	Boil and drink or eat fresh	Flatulence and expel wind
			6	60	10.0	Fruit, seeds	Eat fresh	Laxative
			10	60	16.7	Leaf	Fresh leaf are crushed and applied to the skin	Skin disease
			5	60	8.3	Leaf	Grind and apply to the wound	Wounds and injuries
			11	60	18.3	Leaf, fruit, seeds	Eat fresh	Anthelmintic
			6	60	10.0	Leaf, fruit, seeds	The leaves are boiled and sprayed to kill insects	Insect bites
	<i>Momordica cochinchinensis</i> (Lour.) Spreng.	ผักข้าว	4	13	30.8	Fruit, seeds	Boil and drink or eat fresh	Diabetes mellitus

			5	13	38.5	Fruit, seeds	Boil and drink or eat fresh	Cancer
			1	13	7.7	Fruit, seeds	Boil and drink or eat fresh	Heart disease
			1	13	7.7	Leaf	Bring to a boil to drink	Hemorrhoid
			1	13	7.7	Leaf	Grind and apply to the wound	Wounds and injuries
			1	13	7.7	Fruit, seeds	Boil and drink or eat fresh	Antitussis, cold and mucolytic
Cyperaceae	<i>Actinoscirpus grossus</i> (L.f.) Goetgh. & D.A.Simpson	กกสามเหลี่ยมใหญ่	1	2	50.0	Root	Boiled to drink	Antitussis, cold and mucolytic
Ebenaceae	<i>Diospyros ebenum</i> J.Koenig	หมากโก	1	2	50.0	Root	Boiled to drink	Anthelmintic
			13	53	24.5	Fruit	Eat fresh	Flatulence and expel wind
			7	53	13.2	Leaf, fruit	Grind it and apply it to the skin	Skin disease
			9	53	17.0	Fruit	Applied as a compress on the wound, it can heal the wound	Wounds and injuries
			9	53	17.0	Barks, stem	Boiled to drink	Female, pregnancy, birth and puerperium
	<i>D. mollis</i> (Kurz) Gürke	หมากเกลือ	15	53	28.3	Fruit	Boil and drink or eat fresh	Anthelmintic
			9	37	24.3	Barks, stem	Boiled to drink	Hemorrhoid
			15	37	40.5	Barks, stem	Boiled to drink	Anthelmintic
Euphorbiaceae	<i>Acalypha indica</i> L.	คำเขมมา	13	37	35.1	Fruit	The fruit can be boiled and sprayed to kill insects	Insect bites
			2	12	16.7	Root	Boiled to drink	Laxative
			2	12	16.7	Leaf	Fresh leaf are crushed and applied to the skin	Skin disease
			2	12	16.7	Root	Boiled to drink	Antitussis, cold, mucolytic
			2	12	16.7	Whole parts	Boiled to drink	Anthelmintic
			2	12	16.7	Root	Boiled to drink	Potency
	<i>E. tirucalli</i> L.	สามพันกิ่ง	2	12	16.7	Root	Boiled to drink	Nutritious
			2	7	28.6	Stem	Boiled to drink	Heart disease
			2	7	28.6	Stem	Boiled to drink	Hemorrhoid
			2	7	28.6	Stem	Boiled to drink	Laxative
	<i>Jatropha curcas</i> L.	สบู่ดำ	1	7	14.3	Stem	Boiled to drink	Nutritious
			5	114	4.4	Stem, leaf	Boiled to drink	Cancer
			14	114	12.3	Stem, leaf	Boiled to drink	Hemorrhoid
			10	114	8.8	Stem, leaf	Boiled to drink	Flatulence and expel wind
			14	114	12.3	Stem, leaf	Boiled to drink	Laxative
			20	114	17.5	Leaf, gum	Grind and apply to the rash	Skin disease
			22	114	19.3	Gum	Use latex to treat stomatitis	Wounds and injuries
			13	114	11.4	Root, stem	Boiled to drink	Antitussis, cold, mucolytic
			16	114	14.0	Stem, leaf	Boiled to drink	Anthelmintic
	<i>J. gossypifolia</i> L.	สบู่แดง	17	90	18.9	Leaf, seeds	Boil and drink	Laxative
			20	90	22.2	Leaf, gum	Grind and apply to the rash	Skin disease
			21	90	23.3	Gum	Use latex to treat stomatitis	Wounds and injuries
			16	90	17.8	Root, stem	Boiled to drink	Antitussis, cold, mucolytic
Fabaceae	<i>C. fistula</i> L.	คูณ	16	90	17.8	Stem, leaf	Boiled to drink	Anthelmintic
			9	40	22.5	Stem, barks	Boiled to drink	Hemorrhoid
			5	40	12.5	Leaf	Boiled to drink	Laxative

			2	40	5.0	Leaf	Grind it and apply it to the skin	Wounds and injuries
			13	40	32.5	Stem, barks	Boiled to drink	Antitussis, cold, mucolytic
			2	40	5.0	Stem, barks	Boiled to drink	Anthelmintic
			9	40	22.5	Stem, barks	Boiled to drink	Nutritious
			27	37	73.0	Stem, leaf	Boiled to drink	Hypertension
	<i>Lysiphyllum strychnifolium</i> (Craib) A.Schmitz	ช่านจมแดง						
			1	37	2.7	Stem, leaf	Boiled to drink	Heart disease
			1	37	2.7	Leaf	Boiled to drink	Female, pregnancy, birth and puerperium
			2	37	5.4	Stem, leaf	Boiled to drink	Potency
			6	37	16.2	Leaf	The leaves are boiled and sprayed to kill insects	Insect bites
			2	5	40.0	Stem	Boiled to drink	Hyper tension
	<i>Phanera sirindhorniae</i> (K.Larsen & S.S.Larsen) Mackinder & R.Clark	ว่านประดง						
			1	5	20.0	Stem	Boiled to drink	Skin disease
			2	5	40.0	Stem	Boiled to drink	Nutritious
	<i>Senna alata</i> (L.) Roxb.	ชุมเห็ดเทศ	16	81	19.8	Leaf	Boiled to drink	Heart disease
			15	81	18.5	Leaf	Boil and drink to cure urinary incontinence	Diuretic
			17	81	21.0	Stem, leaf	Boiled to drink	Laxative
			20	81	24.7	Leaf, flower	Grind and apply to the rash	Skin disease
			13	81	16.0	Leaf, flower	Grind and apply to the wound	Wounds and injuries
	<i>S. garrettiana</i> (Craib) H.S.Irwin & Barneby	ขี้เหล็กสาร	11	50	22.0	Stem, leaf, flower	Boiled to drink	Hyper tension
			3	50	6.0	Leaf	Boiled to drink	Diuretic
			18	50	36.0	Stem, leaf	Boiled to drink	Flatulence and expel wind
			18	50	36.0	Leaf	Made it curry and eaten it as a laxativ	Laxative
	<i>S. siamea</i> (Lam.) H.S.Irwin & Barneby	ขี้เหล็ก	6	61	9.8	Stem, leaf, flower	Boiled to drink	Diabetes mellitus
			7	61	11.5	Stem, leaf, flower	Boiled to drink	Hyper tension
			9	61	14.8	Leaf	Fresh leaf are crushed and applied to the skin	Hemorrhoid
			3	61	4.9	Leaf	Boiled to drink	Diuretic
			19	61	31.1	Leaf	Made it curry and eaten it as a laxativ	Laxative
			2	61	3.3	Leaf	Fresh leaf are crushed and applied to the skin	Skin disease
			15	61	24.6	Leaf, flower	Bring to a boil to drink	Anthelmintic
	<i>Tamarindus indica</i> L.	หมากขาม	21	47	44.7	Fruit, seeds	Fruits are eaten fresh	Laxative
			23	47	48.9	Leaf	Fresh leaf are crushed and applied to the skin	Skin disease
			3	47	6.4	Fruit, seeds	Fruits are eaten fresh	Antitussis, cold, mucolytic
Gentianaceae	<i>Cyrtophyllum fragrans</i> (Roxb.) DC.	มันปลา	3	22	13.6	Stem, barks	Boiled to drink	Hemorrhoid
			2	22	9.1	Leaf	Fresh leaf are crushed and applied to the skin	Skin disease
			14	22	63.6	Leaf	Grind and apply to the wound	Wounds and injuries
			3	22	13.6	Stem, barks	Boiled to drink	Antitussis, cold, mucolytic
Iridaceae	<i>Iris domestica</i> (L.) Goldblatt & Mabb.	ว่านหางจิ้ง	2	10	20.0	Whole parts	Boiled to drink	Diuretic
			2	10	20.0	Whole parts	Boiled to drink	Flatulence and expel wind
			2	10	20.0	Flower	The flowers have a light fragrance	Dizziness

			2	10	20.0	Leaf	Fresh leaf are crushed and applied to the skin	Skin disease
			2	10	20.0	Whole parts	Boiled to drink	Antitussis, cold, mucolytic
	<i>Sisyrrinchium palmifolium</i> L.	หอมแดงพม่า	3	23	13.0	Whole parts	Boiled to drink	Diuretic
			10	23	43.5	Whole parts	Boiled to drink	Flatulence and expel wind
			1	23	4.3	Whole parts	Boiled to drink	Laxative
			2	23	8.7	Leaf	Grind and apply to the wound	Wounds and injuries
			4	23	17.4	Whole parts	Boiled to drink	Female, pregnancy, birth and puerperium
Lamiaceae	<i>Coleus amboinicus</i> Lour.	ขี้เหล็ก	3	23	13.0	Whole parts	Grind it to kill insects	Insect bites
			8	19	42.1	Leaf	Grind and apply to the wound	Wounds and injuries
			11	19	57.9	Leaf	Chew fresh leaves to cure cough or boiled and drunk	Antitussis, cold, mucolytic
	<i>Ocimum × africanum</i> Lour.	ผักชีฝรั่ง	5	10	50.0	Root	Boiled to drink	Flatulence and expel wind
			3	10	30.0	Leaf	Boiled to drink	Female, pregnancy, birth and puerperium
	<i>Orthosiphon aristatus</i> (Blume) Miq.	หนวดแมว	2	10	20.0	Root	Boiled to drink	Antitussis, cold, mucolytic
			2	8	25.0	Whole parts	Boiled to drink	Diabetes mellitus
			2	8	25.0	Whole parts	Boiled to drink	Hyper tension
			2	8	25.0	Root	Boiled to drink	Diuretic
Malvaceae	<i>Ceiba pentandra</i> (L.) Gaertn.	จี่ง	2	8	25.0	Leaf	Boiled to drink	Laxative
			3	9	33.3	Barks	Boiled to drink	Flatulence and expel wind
			4	9	44.4	Root, leaf	Grind it and use it to heal wounds and stop bleeding	Wounds and injuries
			2	9	22.2	Root, leaf, fruit	Grind it to help cure all types of snake venom	Insect bites
Meliaceae	<i>Azadirachta indica</i> A.Juss.	สะเดา	1	20	5.0	Stem, leaf	Boiled to drink	Hyper tension
			4	20	20.0	Stem	Boiled to drink	Hemorrhoid
			1	20	5.0	Stem, leaf	Boiled to drink	Diuretic
			3	20	15.0	Leaf, apical, flower	Boil it or eat it fresh	Nutritious
	<i>Sandoricum koetjape</i> (Burm.f.) Merr.	พริกขี้หนู	11	20	55.0	Leaf	The leaf are boiled and sprayed to kill insects	Insect bites
Menispermaceae	<i>Tinospora crispa</i> (L.) Hook. f. & Thomson	เครือขี้หนู	23	23	100.0	Fruit	Fruits are eaten fresh	Laxative
	<i>T. triandra</i> (Colebr.) Diels	ข่านาง	14	14	100.0	Stem, leaf	Boiled to drink to nourish the uterus	Female, pregnancy, birth and puerperium
			9	94	9.6	Stem, leaf	Boiled to drink	Diabetes mellitus
			11	94	11.7	Stem, leaf	Boiled to drink	Hyper tension
			9	94	9.6	Stem, leaf	Boiled to drink	Heart disease
			4	94	4.3	Stem, leaf	Boiled to drink	Gout
			18	94	19.1	Stem, leaf	Grind and apply to the skin	Hemorrhoid
			7	94	7.4	Stem, leaf	Boiled to drink	Laxative
			20	94	21.3	Leaf	Grind and apply to the rash	Skin disease
			3	94	3.2	Stem, leaf	Boiled to drink	Antitussis, cold, mucolytic
Moraceae	<i>A. lacucha</i> Buch.-Ham.	มะหาด	13	94	13.8	Stem, leaf	Boiled to drink	Nutritious
			2	17	11.8	Barks	Boiled to drink	Hyper tension
			3	17	17.6	Barks	Boiled to drink	Diuretic

			4	17	23.5	Barks	Boiled to drink	Flatulence and expel wind
			3	17	17.6	Stem	Boiled to drink	Antitussis, cold, mucolytic
			5	17	29.4	Barks	Boiled to drink	Body aches
	<i>Morus alba</i> L.	หมากมอน	16	16	100.0	Fruit	Fruits are eaten fresh	Laxative
Moringaceae	<i>Moringa oleifera</i> Lam.	ผักอีหนู	1	74	1.4	Leaf	Fresh leaf are crushed and applied to the skin	Diabetes mellitus
			5	74	6.8	Root	Bring to a boil to drink	Heart disease
			23	74	31.1	Leaf, fruit, seeds	Boiled and eaten with chili paste	Flatulence and expel wind
			19	74	25.7	Leaf, fruit, seeds	Boiled and eaten with chili paste	Laxative
			17	74	23.0	Stem	Bring to a boil to drink	Antitussis, cold, mucolytic
			3	74	4.1	Leaf	Boiled to drink	Anthelmintic
			6	74	8.1	Stem	Boiled to drink	Nutritious
Musaceae	<i>M. paradisiaca</i> L.	กล้วยน้ำหว่า	2	40	5.0	Fruit	Fruit sare eaten fresh	Flatulence and expel wind
			16	40	40.0	Fruit	The fruit is pounded into oranges as a laxative	Laxative
			20	40	50.0	Leaf, fruit	Fresh leaf are crushed and applied to the skin	Wounds and injuries
			2	40	5.0	Fruit	Fruits are eaten fresh	Nutritious
Myrtaceae	<i>Psidium guajava</i> L.	หมากสีดา	2	4	50.0	Leaf	Fresh leaf are crushed and applied to the skin	Hemorrhoid
			2	4	50.0	Leaf	Grind and apply to the wound	Wounds and injuries
Nelumbonaceae	<i>Nelumbo nucifera</i> Gaertn.	บัวหลวง	2	58	3.4	Root	Boiled to drink	Hyper tension
			2	58	3.4	Root	Boiled to drink	Cancer
			2	58	3.4	Root	Boiled to drink	Heart disease
			16	58	27.6	Root	Boiled to drink	Diuretic
			11	58	19.0	Root	Eat fresh	Flatulence and expel wind
			10	58	17.2	Flower	Use inhalation to relieve dizziness	Dizziness
			5	58	8.6	Flower	Grind and apply to the wound	Skin disease
			2	58	3.4	Root	Boiled to drink	Female, pregnancy, birth and puerperium
			7	58	12.1	Root	Boiled to drink	Antitussis, cold, mucolytic
			1	58	1.7	Root	Boiled to drink	Nutritious
Oxalidaceae	<i>Averrhoa bilimbi</i> L.	หมากตะลิงปลิง	4	51	7.8	Fruit	Eat fresh	Flatulence and expel wind
			23	51	45.1	Fruit	Eat fresh	Laxative
			11	51	21.6	Fruit	Eat fresh	Antitussis, cold, mucolytic
			13	51	25.5	Leaf, fruit	Boil and drink or eat fresh	Anthelmintic
	<i>A. carambola</i> L.	หมากเฟือง	20	20	100.0	Fruit	Fruits are eaten fresh	Laxative
Pandanaceae	<i>Pandanus amaryllifolius</i> Roxb.	เดย	17	101	16.8	Leaf	Boiled to drink	Hypertension
			19	101	18.8	Leaf	Crush to reduce dizziness	Dizziness
			15	101	14.9	Leaf	Grind and apply to the rash	Skin disease
			15	101	14.9	Leaf	Grind and apply to the wound	Wounds and injuries
			18	101	17.8	Leaf	Boil and compress on the body	Body aches
			17	101	16.8	Leaf	Boil and drink for nourish the body	Nutritious
Passifloraceae	<i>Passiflora edulis</i> Sims	เสาวรส	14	75	18.7	Fruit, seeds	Fruits are eaten fresh	Diuretic
			23	75	30.7	Fruit, seeds	Fruits are eaten fresh	Laxative
			16	75	21.3	Fruit	The peel of the fruit is rubbed on the skin to treat itchy rashes.	Skin disease
			22	75	29.3	Fruit, seeds	Fruits are eaten fresh	Antitussis, cold, mucolytic

Phyllanthaceae	<i>P. foetida</i> L.	ผักอีโป๊ะ	13	81	16.0	Root	Boiled to drink	Hyper tension
			12	81	14.8	Root	Boiled to drink	Heart disease
			23	81	28.4	Fruit, seeds	Fruits are eaten fresh	Laxative
			12	81	14.8	Fruit, seeds	Use inhalation to relieve dizziness	Dizziness
	<i>Antidesma puncticulatum</i> Miq.	หมากหน้า	21	81	25.9	Root	Boiled to drink	Antitussis, cold, mucolytic
			23	23	100.0	Fruit	Fruits are eaten fresh	Laxative
	<i>Phyllanthus acidus</i> (L.) Skeels	หมากขม	19	52	36.5	Fruit	Fruits are eaten fresh	Flatulence and expel wind
			23	52	44.2	Fruit	Fruits are eaten fresh	Laxative
	<i>P. emblica</i> L.	หมากขามป้อม	10	52	19.2	Leaf	Fresh leaf are crushed and applied to the skin	Skin disease
			17	84	20.2	Fruit	Boiled to drink or fruits are eaten fresh	Hyper tension
14			84	16.7	Fruit	Boiled to drink or fruits are eaten fresh	Cancer	
6			84	7.1	Fruit	Boiled to drink or fruits are eaten fresh	Heart disease	
23			84	27.4	Fruit	Fruits are eaten fresh	Laxative	
24			84	28.6	Fruit	The to moisten the throat and reduce coughing or eat fresh as a laxative	Antitussis, cold, mucolytic	
Piperaceae	<i>Peperomia pellucida</i> (L.) Kunth	กระดังง์	1	10	10.0	Whole parts	Boiled to drink	Cancer
			2	10	20.0	Whole parts	Boiled to drink	Gout
			2	10	20.0	Whole parts	Boiled to drink	Hemorrhoid
			3	10	30.0	Whole parts	Grind it and apply it to the skin	Skin disease
	<i>Piper betle</i> L.	พญ	2	10	20.0	Whole parts	Grind and apply to the wound	Wounds and injuries
			3	63	4.8	Whole parts	Boiled to drink	Flatulence and expel wind
			2	63	3.2	Whole parts	Boiled to drink	Laxative
			6	63	9.5	Leaf	Crush and smell to relieve dizziness	Dizziness
			20	63	31.7	Leaf	Fresh leaf are crushed and applied to the skin	Skin disease
			20	63	31.7	Leaf	Grind and apply to the wound	Wounds and injuries
			3	63	4.8	Whole parts	Boiled to drink	Antitussis, cold, mucolytic
	<i>P. longum</i> L.	คึบลิ	6	63	9.5	Leaf	Boiled to drink	Anthelmintic
			3	63	4.8	Leaf	The leaves are boiled and sprayed to kill insects	Insect bites
			2	10	20.0	Flower	Boiled to drink	Flatulence and expel wind
			2	10	20.0	Fruit	Boiled to drink	Female, pregnancy, birth and puerperium
2			10	20.0	Fruit	Boiled to drink	Body aches	
<i>P. sarmentosum</i> Roxb.	ผักอีเล็ด	2	10	20.0	Root, stem, leaf, flower, fruit	Boiled to drink	Anthelmintic	
		2	10	20.0	Fruit	Boiled to drink	Nutritious	
		6	26	23.1	Whole parts	Boiled to drink	Cancer	
		3	26	11.5	Whole parts	Boiled to drink	Diuretic	
		7	26	26.9	Leaf	Boiled to drink	Flatulence and expel wind	
Plantaginaceae	<i>Limnophila geoffrayi</i> Bonati	ผักกะเขย	4	26	15.4	Whole parts	Boiled to drink	Antitussis, cold, mucolytic
			6	26	23.1	Whole parts	Boiled to drink	Nutritious
			6	12	50.0	Whole parts	Used as food ingredient	Flatulence and expel wind
			3	12	25.0	Whole parts	Grind it or rub it and smell it	Dizziness

Poaceae	<i>Bambusa beecheyana</i> Munro	ไม้คิมซุง	3	12	25.0	Whole parts	Boiled to drink	Antitussis, cold, mucolytic
			2	26	7.7	Root	Boiled to drink	Cancer
			4	26	15.4	Root	Boiled to drink	Flatulence and expel wind
			17	26	65.4	Root	Boiled to drink	Wounds and injuries
	<i>B. bambos</i> (L.) Voss.	ไม้ป่า	3	26	11.5	Root	Boil and drink to nourish the blood	Nutritious
			2	26	7.7	Root	Boiled to drink	Cancer
			4	26	15.4	Root	Boiled to drink	Flatulence and expel wind
			17	26	65.4	Leaf	Fresh leaf are crushed and applied to the skin	Wounds and injuries
	<i>B. multiplex</i> (Lour.) Raeusch. ex Schult.f.	ไม้เลื้อย	3	26	11.5	Root	Boil and drink to nourish the blood	Nutritious
			2	26	7.7	Root	Boiled to drink	Cancer
			4	26	15.4	Root	Boiled to drink	Flatulence and expel wind
			17	26	65.4	Leaf	Fresh leaf are crushed and applied to the skin	Wounds and injuries
	<i>B. spinosa</i> Roxb.	ไม้บ้าน	3	26	11.5	Root	Boil and drink to nourish the blood	Nutritious
			2	26	7.7	Root	Boiled to drink	Cancer
			4	26	15.4	Root	Boiled to drink	Flatulence and expel wind
			17	26	65.4	Leaf	Fresh leaf are crushed and applied to the skin	Wounds and injuries
	<i>Cymbopogon citratus</i> (DC.) Stapf.	ตะไคร้	3	26	11.5	Root	Boil and drink to nourish the blood	Nutritious
			10	26	38.5	Whole parts	Boiled to drink	Flatulence and expel wind
			3	26	11.5	Whole parts	Boiled to drink	Antitussis, cold, mucolytic
			7	26	26.9	Whole parts	Boiled to drink	Body aches
<i>S. sinense</i> Roxb.	ชื่อยคำ	2	26	7.7	Whole parts	Boiled to drink	Anthelmintic	
		4	26	15.4	Whole parts	Boiled to drink	Nutritious	
		2	10	20.0	Whole parts	Grind it to kill insects	Diabetes mellitus	
		2	10	20.0	Stem	The stems are squeezed to extract the nectar for drinking	Diuretic	
		1	10	10.0	Stem	The fibers of the stem help heal wounds	Wounds and injuries	
		1	10	10.0	Root	Boiled to drink	Antitussis, cold, mucolytic	
Rubiaceae	<i>Mitragyna speciosa</i> Korth.	กระท่อมก้านแดง	2	10	20.0	Stem	The stems are squeezed to extract the nectar for drinking	Potency
			2	10	20.0	Stem	The stems are squeezed to extract the nectar for drinking	Nutritious
			5	23	21.7	Leaf	Boiled to drink	Diabetes mellitus
			7	23	30.4	Leaf	Boiled to drink	Laxative
	<i>M. diversifolia</i> (Wall. ex G.Don) Havil.	ท่ม	5	23	21.7	Leaf	Boiled to drink	Antitussis, cold, mucolytic
			6	23	26.1	Leaf	Boiled to drink	Anthelmintic
			2	6	33.3	Leaf	Boiled to drink	Flatulence and expel wind
			2	6	33.3	Root, barks, stem	Boiled to drink	Antitussis, cold and mucolytic
	<i>M. coreia</i> Buch.-Ham.	ชอป่า	2	6	33.3	Stem	Boiled to drink	Nutritious
			2	23	8.7	Root, stem	Boiled to drink	Diabetes mellitus
			2	23	8.7	Root, stem	Boiled to drink	Hyper tension
			2	23	8.7	Root	Boiled to drink	Tuberculosis

			4	23	17.4	Leaf	Boiled to drink	Hemorrhoid		
			5	23	21.7	Root, stem	Boiled to drink	Female, pregnancy, birth and puerperium		
Rutaceae	<i>C. aurantiifolia</i> (Christm.) Swingle	บั๊กมะนาวเป็น	4	23	17.4	Root, stem	Boiled to drink	Antitussis, cold, mucolytic		
			4	23	17.4	Leaf	Used to grind to cure insect venom	Insect bites		
			4	20	20.0	Fruit	Fruits are eaten fresh	Flatulence and expel wind		
			16	20	80.0	Fruit	Fruits are eaten fresh	Laxative		
			4	50	8.0	Leaf, fruit, seeds	Boiled to drink	Diuretic		
	<i>C. hystrix</i> DC.	หมากกรูด								
Sapindaceae	<i>Lepisanthes rubiginosa</i> (Roxb.) Leenh.	หมากหวดข่า	23	50	46.0	Leaf, fruit	Grind it or rub it and smell it	Dizziness		
			23	50	46.0	Fruit	Dip the fruit with salt and eat	Antitussis, cold, mucolytic		
			13	52	25.0	Stem	Boiled to drink	Hemorrhoid		
			9	52	17.3	Leaf	Fresh leaf are crushed and applied to the skin	Skin disease		
			19	52	36.5	Stem, leaf	Boiled to drink	Flatulence and expel wind		
			4	52	7.7	Stem	Boiled to drink	Female, pregnancy, birth and puerperium		
Saururaceae	<i>Schleichera oleosa</i> (Lour.) Oken	หมากคร้อ	7	52	13.5	Stem	Boiled to drink	Nutritious		
			23	23	100.0	Fruit	Fruits are eaten fresh	Laxative		
			1	12	8.3	Root	Boiled to drink	Hyper tension		
			2	12	16.7	Leaf	Fresh leaf are crushed and applied to the skin	Skin disease		
			3	12	25.0	Leaf	Grind and apply to the wound	Wounds and injuries		
Solanaceae	<i>Capsicum annuum</i> L.	พริก	3	12	25.0	Root	Boiled to drink	Antitussis, cold, mucolytic		
			3	12	25.0	Leaf	Fresh leaf are crushed and applied to the skin	Insect bites		
			1	12	8.3	Root	Boiled to drink	Hyper tension		
			1	12	8.3	Root	Boiled to drink	Heart disease		
			2	12	16.7	Root	Boiled to drink	Diuretic		
			4	12	33.3	Fruit, seeds	Used as food ingredient	Laxative		
			3	12	25.0	Leaf	Fresh leaf are crushed and applied to the skin	Skin disease		
			1	12	8.3	Leaf	Fresh leaf are crushed and applied to the skin	Insect bites		
			<i>Nicotiana tabacum</i> L.	ยาสูบ	7	53	13.2	Root	Boiled to drink	Heart disease
					8	53	15.1	Root	Boiled to drink	Hemorrhoid
					13	53	24.5	Leaf	Fresh leaf are crushed and applied to the skin	Skin disease
					15	53	28.3	Leaf	Grind and apply to the wound	Wounds and injuries
					10	53	18.9	Leaf	The leaves are boiled and sprayed to kill insects	Insect bites
			<i>Solanum aculeatissimum</i> Jacq.	หมากเขื่อน	1	22	4.5	Root	Boiled to drink	Cancer
					19	22	86.4	Root	Boiled to drink	Antitussis, cold, mucolytic
2	22	9.1			Root	Boiled to drink	Nutritious			
<i>S. lycopersicum</i> L.	หมากเขื่อนเทศ	23	23	100.0	Fruit, seeds	Fruits are eaten fresh	Skin disease			
<i>S. procumbens</i> Lour.	หมากเขื่อนขม	5	59	8.5	Root	Boiled to drink	Cancer			
		7	59	11.9	Root	Boiled to drink	Diuretic			
		23	59	39.0	Root, fruit, seeds	Chew fresh leaves to cure cough or boiled and drunk	Antitussis, cold, mucolytic			

			16	59	27.1	Root, fruit, seeds	Boiled to drink	Anthelmintic
			8	59	13.6	Root, fruit, seeds	Boiled to drink	Nutritious
Stemonaceae	<i>Stemona tuberosa</i> var. <i>moluccana</i> (Blume) ined.	หนอนดาชาก	1	9	11.1	Stem, leaf	Boiled to drink or fruits are eaten fresh	Skin disease
			1	9	11.1	Stem, leaf	Boiled to drink or fruits are eaten fresh	Wounds and injuries
			3	9	33.3	Stem, leaf	Boiled to drink	Antitussis, cold, mucolytic
			3	9	33.3	Stem, leaf	Blended with water to drink	Anthelmintic
Talinaceae	<i>Talinum paniculatum</i> (Jacq.) Gaertn.	โสมไทย	1	9	11.1	Stem, leaf	Grind it to kill insects	Insect bites
			2	27	7.4	Whole parts	Boiled to drink	Flatulence and expel wind
			18	27	66.7	Leaf	Boiled to drink	Laxative
			3	27	11.1	Root	Helps correct menstrual irregularities in women or menstruation is irregular	Female, pregnancy, birth and puerperium
Zingiberaceae	<i>Alpinia galanga</i> (L.) Willd.	ข่าบ้าน	4	27	14.8	Root	Boiled to drink	Nutritious
			13	52	25.0	Rhizome	Boiled to drink	Heart disease
			19	52	36.5	Rhizome	Boiled to drink	Flatulence and expel wind
			9	52	17.3	Leaf	Fresh leaf are crushed and applied to the skin	Skin disease
			4	52	7.7	Rhizome	Boil and drink to stimulate milk production	Female, pregnancy, birth and puerperium
			7	52	13.5	Rhizome	Boiled to drink	Nutritious
	<i>Boesenbergia rotunda</i> (L.) Mansf.	กระชายขาว	7	83	8.4	Root, rhizome	Boiled to drink	Hyper tension
			23	83	27.7	Root, rhizome	Grind and apply on the stomach and bring to a boil to drink	Flatulence and expel wind
			19	83	22.9	Root, rhizome	Boiled to drink	Antitussis, cold and mucolytic
			22	83	26.5	Root, rhizome	Boil and compress on the body	Body aches
			2	83	2.4	Root, rhizome	Boiled to drink	Potency
			10	83	12.0	Root, rhizome	Boil and drink for nourish the body	Nutritious
	<i>Curcuma longa</i> L.	ขมิ้น	6	226	2.7	Rhizome	Boiled to drink	Diabetes mellitus
			6	226	2.7	Rhizome	Boiled to drink	Hyper tension
			12	226	5.3	Rhizome	Boiled to drink	Cancer
			20	226	8.8	Rhizome	Grind and apply to the wound	Hemorrhoid
			15	226	6.6	Rhizome	Boiled to drink	Diuretic
			23	226	10.2	Rhizome	Boiled to drink	Flatulence and expel wind
			16	226	7.1	Rhizome	Boiled to drink	Laxative
			23	226	10.2	Rhizome	Grind and apply to the skin	Skin disease
			19	226	8.4	Rhizome	Grind and apply to the wound	Wounds and injuries
			19	226	8.4	Rhizome	Boiled to drink	Female, pregnancy, birth and puerperium
			16	226	7.1	Rhizome	Boil and compress on the body	Body aches
			11	226	4.9	Rhizome	Boiled to drink	Anthelmintic
			20	226	8.8	Rhizome	Boiled to drink	Nutritious
			20	226	8.8	Rhizome	Grind and apply to the wound	Insect bites
	<i>Elettaria cardamomum</i> (L.) Maton	กระวาน	2	9	22.2	Rhizome	Boiled to drink	Hyper tension

		2	9	22.2	Rhizome	Boiled to drink	Flatulence and expel wind
		2	9	22.2	Rhizome	Grind it and apply it to the skin	Skin disease
		2	9	22.2	Rhizome, stem, leaf	Boiled to drink	Anthelmintic
		1	9	11.1	Rhizome	Boiled to drink	Nutritious
<i>Globba winitii</i> C.H.Wright	เข้าพรรษา	8	8	100.0	Leaf	Fresh leaf are crushed and applied to the skin	Skin disease
<i>Hedychium coronarium</i> J.Koenig	ตลอด	8	19	42.1	Rhizome	Boiled to drink	Flatulence and expel wind
		11	19	57.9	Rhizome	Boiled to drink	Insect bites
<i>Kaempferia parviflora</i> Wall. ex Baker	กระชายดำ	16	39	41.0	Root, rhizome	Grind it and apply it to the stomach area	Flatulence and expel wind
		10	39	25.6	Root, rhizome	Boil and drink or eat fresh	Female, pregnancy, birth and puerperium
		4	39	10.3	Root, rhizome	Boiled to drink	Potency
		9	39	23.1	Root, rhizome	Boiled to drink	Nutritious
<i>Stahliathus campanulatus</i> Kuntze.	ว่านด็กเค็ด	7	10	70.0	Rhizome	Boiled to drink	Diuretic
		3	10	30.0	Rhizome	Grind it and apply it to the skin	Insect bites
<i>Zingiber montanum</i> (J.Koenig) Link ex A.Dietr.	ว่านไฟ	17	84	20.2	Rhizome, stem, leaf	Boiled to drink	Hyper tension
		21	84	25.0	Rhizome, stem, leaf	Boiled to drink	Hemorrhoid
		23	84	27.4	Rhizome	Grind it and apply it to the stomach area	Flatulence and expel wind
		23	84	27.4	Rhizome	Grind it and apply it to the skin	Skin disease
<i>Z. officinale</i> Roscoe	ขิงน้อย	5	37	13.5	Whole parts	Boiled to drink	Diuretic
		23	37	62.2	Rhizome	Boiled to drink	Flatulence and expel wind
		3	37	8.1	Rhizome, leaf	Grind it and apply it to the skin	Skin disease
		2	37	5.4	Rhizome, leaf	Grind and apply to the wound	Wounds and injuries
		2	37	5.4	Rhizome	Boiled to drink	Female, pregnancy, birth and puerperium
		2	37	5.4	Rhizome	Boiled to drink	Antitussis, cold, mucolytic
<i>Z. zerumbet</i> (L.) Roscoe ex Sm.	ขี้ผึ้ง	2	14	14.3	Rhizome	Boiled to drink	Hypertension
		4	14	28.6	Rhizome, stem, leaf	Boiled to drink	Hemorrhoid
		1	14	7.1	Rhizome, stem, leaf	Boiled to drink	Diuretic
		3	14	21.4	Rhizome, leaf	Grind it and apply it to the skin	Skin disease
		2	14	14.3	Rhizome	Boiled to drink	Female, pregnancy, birth and puerperium
		2	14	14.3	Rhizome	Boiled to drink	Nutritious

Note: %FL: Fidelity Level, Np: Number of reported utilization of the plant for that syndrome, N: Number of reports of utilization of that plant in all syndromes

Table 6. The most used medicinal plant species for medical categories by Laos Isan ethnic group based on 14 highest fidelity level

Scientific name	Thai name	Np	N	%FL	Used parts	Instruction	Medical category
<i>Mangifera indica</i>	หมากม่วง	23	23	100	Fruit	Fruits are eaten fresh	Laxative
<i>Sandoricum koetjape</i>	หมากค้อง	23	23	100	Fruit	Fruits are eaten fresh	Laxative
<i>Antidesma puncticulatum</i>	หมากเม่า	23	23	100	Fruit	Fruits are eaten fresh	Laxative
<i>Schleichera oleosa</i>	หมากคร้อ	23	23	100	Fruit	Fruits are eaten fresh	Laxative
<i>Solanum lycopersicum</i>	หมากเขือเทศ	23	23	100	Fruit, seeds	Fruits are eaten fresh	Skin disease
<i>Averrhoa carambola</i>	หมากเฟือง	20	20	100	Fruit	Fruits are eaten fresh	Laxative
<i>Garcinia schomburgkiana</i>	หมากคั้น	18	18	100	Fruit	Fruits are eaten fresh	Laxative
<i>Morus alba</i>	หมากม่อน	16	16	100	Fruit	Fruits are eaten fresh	Laxative
<i>Bouea macrophylla</i>	หมากปราง	15	15	100	Fruit	Fruits are eaten fresh	Flatulence and expel wind
<i>Tinospora crispa</i>	เครือคอฮอ	14	14	100	Stem, leaf	Boiled to nourish the uterus	Female, pregnancy, birth and puerperium
<i>Globba winitii</i>	เข้าพรรษา	8	8	100	Leaf	Fresh leaf are crushed and applied to the skin	Skin disease
<i>Phoenix dactylifera</i>	อินทผาลัม	6	6	100	Fruit	Fruits are eaten fresh	Nutritious
<i>Dracaena hyacinthoides</i>	ลิ้นมังกร	4	4	100	Whole parts	Placed in empty space in the bedroom helps absorb toxins	Antitussis, cold and mucolytic
<i>Allium sp.</i>	ว่านพญาลิ้นงู	2	2	100	Whole parts	Grind it and apply it to cure snake venom	Insect bites

Note: %FL: Fidelity level, Np: Number of reported utilization of the plant for that syndrome, N: Number of reports of utilization of that plant in all syndromes

Table 7. Medicinal plants with most useful reports and fidelity level used by Laos Isan ethnic group

Scientific name	Total no. of symptoms	Np	N	%FL	Parts used	Mode of application	Medical category
<i>Curcuma longa</i> (ขมิ้น)*	14	23	226	10.2	Rhizome	Boiled to drink	Flatulence and expel wind
		23	226	10.2	Rhizome	Grind and apply to the skin	Skin disease
		20	226	8.8	Rhizome	Grind and apply to the wound	Hemorrhoid
		20	226	8.8	Rhizome	Boiled to drink	Nutritious
		20	226	8.8	Rhizome	Grind and apply to the wound	Insect bites
		19	226	8.4	Rhizome	Grind and apply to the wound	Wounds and injuries
		19	226	8.4	Rhizome	Boiled to drink	Female, pregnancy, birth, puerperium
		16	226	7.1	Rhizome	Boiled to drink	Laxative
		16	226	7.1	Rhizome	Boil and compress on the body	Body aches
		15	226	6.6	Rhizome	Boiled to drink	Diuretic
		12	226	5.3	Rhizome	Boiled to drink	Cancer
		11	226	4.9	Rhizome	Boiled to drink	Anthelmintic
		6	226	2.7	Rhizome	Boiled to drink	Diabetes mellitus
		6	226	2.7	Rhizome	Boiled to drink	Hyper tension
<i>Nelumbo nucifera</i> (บัวหลวง)*	10	16	58	27.6	Root	Boiled to drink	Diuretic
		11	58	19.0	Root	Eat fresh	Flatulence and expel wind
		10	58	17.2	Flower	Use inhalation to relieve dizziness	Dizziness
		7	58	12.1	Root	Boiled to drink	Antitussis, cold and mucolytic
		5	58	8.6	Flower	Grind and apply to the wound	Skin disease
		2	58	3.4	Root	Boiled to drink	Hyper tension
		2	58	3.4	Root	Boiled to drink	Cancer
		2	58	3.4	Root	Boiled to drink	Heart disease
		2	58	3.4	Root	Boiled to drink	Female, pregnancy, birth, puerperium
		1	58	1.7	Root	Boiled to drink	Nutritious
<i>Tinospora triandra</i> (ชันนาง)*	9	20	94	21.3	Leaf	Grind and apply to the rash	Skin disease
		18	94	19.1	Stem, leaf	Grind and apply to the skin	Hemorrhoid
		13	94	13.8	Stem, leaf	Boiled to drink	Nutritious
		11	94	11.7	Stem, leaf	Boiled to drink	Hyper tension
		9	94	9.6	Stem, leaf	Boiled to drink	Diabetes mellitus
		9	94	9.6	Stem, leaf	Boiled to drink	Heart disease
		7	94	7.4	Stem, leaf	Boiled to drink	Laxative
		4	94	4.3	Stem, leaf	Boiled to drink	Gout
3	94	3.2	Stem, leaf	Boiled to drink	Antitussis, cold and mucolytic		

<i>Cocos nucifera</i> (มะพร้าว)*	8	6	22	27.3	Seeds	Eat the flesh seed and drink the juice	Skin disease
		5	22	22.7	Root	Eat the flesh seed and drink the juice	Heart disease
		5	22	22.7	Seeds	Drink the water inside the seeds	Anthelmintic
		2	22	9.1	Barks	The bark of the trunk is burned to ashes and is used to treat the skin	Diuretic
		1	22	4.5	Root	Boiled to drink	Diabetes mellitus
		1	22	4.5	Root	Boiled to drink	Hyper tension
		7	22	4.5	Root	The water inside the seeds is good for stopping bleeding	Wounds and injuries
		1	22	4.5	Fruit	Apply the oil to the insect bites	Insect bites
<i>Momordica charantia</i> (คันทวย)*	8	11	60	18.3	Leaf, fruit, seeds	Eat fresh	Anthelmintic
		10	60	16.7	Leaf	Crushed and applied to the skin	Skin disease
		9	60	15.0	Leaf, fruit, seeds	Boil and drink or eat fresh	Flatulence and expel wind
		7	60	11.7	Leaf	Boiled to drink	Hemorrhoid
		6	60	10.0	Leaf, fruit, seeds	Boiled or eaten raw	Diabetes mellitus
		6	60	10.0	Fruit, seeds	Eat fresh	Laxative
		6	60	10.0	Leaf, fruit, seeds	The leaves are boiled and sprayed to kill insects	Insect bites
		5	60	8.3	Leaf	Grind and apply to the wound	Wounds and injuries
<i>Jatropha curcas</i> (คางคก)*	8	22	114	19.3	Gum	Use latex to treat stomatitis	Wounds and injuries
		20	114	17.5	Leaf, gum	Grind and apply to the rash	Skin disease
		16	114	14.0	Stem, leaf	Boiled to drink	Anthelmintic
		14	114	12.3	Stem, leaf	Boiled to drink	Hemorrhoid
		14	114	12.3	Stem, leaf	Boiled to drink	Laxative
		13	114	11.4	Root, stem	Boiled to drink	Antitussis, cold and mucolytic
		10	114	8.8	Stem, leaf	Boiled to drink	Flatulence and expel wind
		5	114	4.4	Stem, leaf	Boiled to drink	Cancer
<i>Piper betle</i> (พริก)*	8	20	63	31.7	Leaf	Crushed and applied to the skin	Skin disease
		20	63	31.7	Leaf	Grind and apply to the wound	Wounds and injuries
		6	63	9.5	Leaf	Crush and smell to relieve dizziness	Dizziness
		6	63	9.5	Leaf	Boiled to drink	Anthelmintic
		3	63	4.8	Whole parts	Boiled to drink	Flatulence and expel wind
		3	63	4.8	Whole parts	Boiled to drink	Antitussis, cold and mucolytic
		3	63	4.8	Leaf	The leaves are boiled and sprayed to kill insects	Insect bites
		2	63	3.2	Whole parts	Boiled to drink	Laxative
<i>Moringa oleifera</i> (คอกอัญชัญ)*	7	23	74	31.1	Leaf, fruit, seeds	Boiled and eaten with chili paste	Flatulence and expel wind
		19	74	25.7	Leaf, fruit, seeds	Boiled and eaten with chili paste	Laxative
		17	74	23.0	Stem	Boiled to drink	Antitussis, cold and mucolytic
		6	74	8.1	Stem	Boiled to drink	Nutritious
		5	74	6.8	Root	Boiled to drink	Heart disease
		3	74	4.1	Leaf	Boiled to drink	Anthelmintic
		1	74	1.4	Leaf	Fresh leaf are crushed and applied to the skin	Diabetes mellitus
		19	61	31.1	Leaf	Made into curry and eaten as a laxative	Laxative
<i>Senna siamea</i> (ขี้เหล็ก)*	7	15	61	24.6	Leaf, flower	Boiled to drink	Anthelmintic
		9	61	14.8	Leaf	Fresh leaf are crushed and applied to the skin	Hemorrhoid
		7	61	11.5	Stem, leaf, flower	Boiled to drink	Hyper tension
		6	61	9.8	Stem, leaf, flower	Boiled to drink	Diabetes mellitus
		3	61	4.9	Leaf	Boiled to drink	Diuretic
		2	61	3.3	Leaf	Crushed and applied to the skin	Skin disease
		5	23	21.7	Root, stem	Boiled to drink	Female, pregnancy, birth, puerperium
		4	23	17.4	Leaf	Boiled to drink	Hemorrhoid
<i>Mitragyna coreia</i> (ยาบ้า)*	7	4	23	17.4	Root, stem	Boiled to drink	Antitussis, cold and mucolytic
		4	23	17.4	Leaf	Used to grind to cure insect venom	Insect bites
		2	23	8.7	Root, stem	Boiled to drink	Diabetes mellitus
		2	23	8.7	Root, stem	Boiled to drink	Hyper tension
		2	23	8.7	Root	Boiled to drink	Tuberculosis

Note: *: Laos Isan Name, %FL: Fidelity Level, Np: Number of reported utilization of the plant for that syndrome, N: Number of reports of utilization of that plant in all syndromes

In summary, there are a total of 291 plant species belonging to 88 families and 229 genera utilized by Isaan Laos ethnic group in Sadam Sri Village based on their traditional knowledge. They are further divided into 12 groups based on their specific uses, including 168 species used for food and spices, 109 species used as medicinal herbs, 74 species used for ornamental purposes, 40 species used for construction and materials, 35 species used in beliefs and rituals, 27 species used as fuels, 20 species used for poisoning, 17 species used for beverages, 5 species used for dyeing, 4 species used in cosmetics and perfumery, 3 species used as industrial crops and 2 species for apparel. *Oryza sativa* is the most often utilized plant, with a CI value of 4.74, followed by *Senna siamea* (3.39) and *Pandanus amaryllifolius* (3.30). The body aches has the highest IAR value with 0.94, while potency had the lowest IAR value with 0.67. The plant with the highest FL % for medicinal usage is *Curcuma longa*. This plant is commonly used to cure several ailments, with the most common being flatulence, wind expulsion, and skin disease. *C. longa* is associated with 14 syndromes and has the highest CI value of 9.83. This study systematically recorded and collected data as fundamental knowledge for the conservation of plants, ensuring their availability for future generations. This information will serve as a reference for the preservation of traditional knowledge and the sustainable cultivation and commercialization of medicinal plants.

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