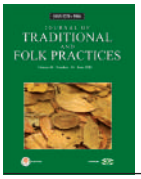

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Variation of ethnomedicinal knowledge among the Tai Phake of Upper Assam region, Northeast India

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Abstract

The Tai Phake, one of the significant Tai tribe of Upper Assam, Northeast India, has rich culture of practicing traditional ethnomedicine. The Tais fall under the Mongoloid race and hence they are characterized by straight black hair, almond shaped dark brown eyes, a flattened face and an upraised cheekbone. This paper deals with the variation of ethnomedicinal information which have been quantitatively analysed by statistical tools such as Fidelity Level (FL %), Importance Value (IVs), Direct Matrix Ranking (DMR) and Consensus value of plant Parts (CPP). Altogether 38 species of medicinal plants under 23 families have been recorded which are used by the informants for 22 different ailments. On the basis of their habit recorded plant species have been categorised in four types such as trees, shrub, herbs and climbers. Leaves secured the highest CPP value and eight plants have cent percent Fidelity Level e.g. *Curcuma longa* L., *Eupatorium cannabinum* L., *Jatropha curcas* L. *Senna alata* L., *Clerodendron glandulosum* Lindley , *Tebernaemontana divaricata* (L.) R. Brown, *Zingiber officinale* Roscoe etc. Quantitative analysis highlights the potentiality of plant resources in herbal practice of Tai Phake. This ethnomedicinal study provides clue for the further approaches to scientific validation that may leads to natural drug discovery.

Keywords: Tai Phake, Ethnomedicine, Quantitative analysis, Scientific validation

1. Introduction

Since antiquity plants have been used as source of healing by mankind. Plant based traditional medicines play a key role in the development of novelties in drug discovery (Wright, 2003). A large number of plants have been claimed to possess antibiotic properties in many traditional systems of medicine and are also used extensively by the tribal people worldwide (Tiwari *et al.*, 2011). Ethnomedicine refers to the study of traditional medical practice which is concerned with the cultural interpretation of health, diseases and illness and also addresses the healthcare seeking process and healing practices (Krippner, 2003). The practice of ethnomedicine is a complex multidisciplinary system constituting the use of plants medicinally, spiritually and the natural environment has been the source of healing for people for millennia (Lowe *et al.,* 2000). In 77 AD, Dioscorides, the father of Pharmacognosy, studied medicinal plants and documented the work in the "De Materia Medica" (Petrovska, 2012). India has an estimated record of 45,000 plant species and various estimations have put the list to 7500 species of medicinal plants (Ashish *et al.*, 2005). Ethnomedicines have been practised around the world as source of healing and numerous research papers on medicinal

practices of different ethnic groups have so far been published in the dedicated journals from different parts of the world including India. Gibji *et al.* (2012), Chauhan (2014), Khuonkaew *et al.* (2014), Khan *et al.* (2014), Uddin and Hassan (2004), Choudhuri and Karmakar (2015), Das *et al.* (2007), Borthakur (1981), Gogoi (1994), Gogoi (2006), Teranpi *et al.*(2015), etc.

Among six Tai ethnic groups of Assam, the Tai Phake is the second largest group with a population of only about 2000 (Moran, 2009). They exhibit rich ethnobotanical heritage inherited from their ancestors. Plant resources along with animal resources form the basis of their sustenance and this relationship is reflected in their social, cultural and religious life. One of the ethnobotanical heritages of the Tai Phake people is health care practice, a tradition that is about 260 yrs old as they entered Assam in1756. But the Tai Phake has remained unattended by researchers. No systematic study has been initiated to document the invaluable knowledge of these people. The current research is pioneer to study and document the ethnomedicines employed by traditional healers. It is imperative to document medicinal plants knowledge of this tribe before it is lost due to acculturation of the new generation and natural calamities mainly by soil erosion. Every year the people of Borphake village are facing major problem of soil erosion of Burhidihing River and also it becomes threat of degradation of forest coverage (Fig.13). This year the river came very closer to the door of a renowned practitioner Ai Lun Khong Weingken (Fig.11). The purpose of the study is to assess the traditional knowledge of medicinal plants and distribution of such knowledge among Tai Phake of Assam. Quantitative investigation of ethnomedicines among indigenous people can prove the usefulness for identification of potential plants for future study (Uddin and Hassan, 2014, Choudhuri and Karmakar, 2015).

2. Materials and Methods

2.1. Study area

The Tai Phake people are a small population inhabiting in the riverine areas of Dibrugarh and Tinsukia districts of Assam. They originally represent a hill tribe within the large Tai family. The Tais are distributed in Assam and throughout the region of Yunnan province of China and *Induchina peninsula* (Thakur, 1982). Before entering Assam, they dwelt beside the Turungpani river of Arunachal Pradesh and after reaching Assam they first settled on the bank of the Burhidihing River in Tinsukia district (Gogoi, 1995). The people are mainly dependent on farming for sustenance and livelihoods. Ethnomedicine, inherited from ancestors, is still indispensable for their primary healthcare although they also have access to modern medicines through government agencies.

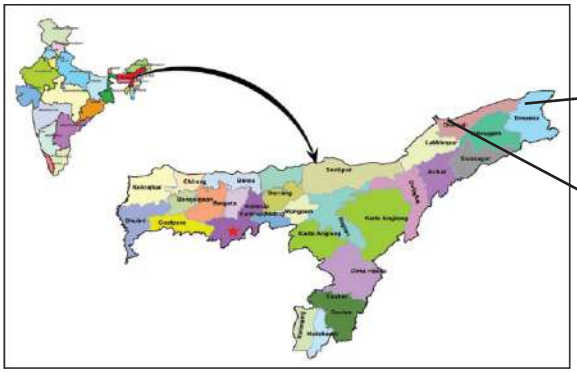

Fig. 1. District map of Assam State, Northeast India

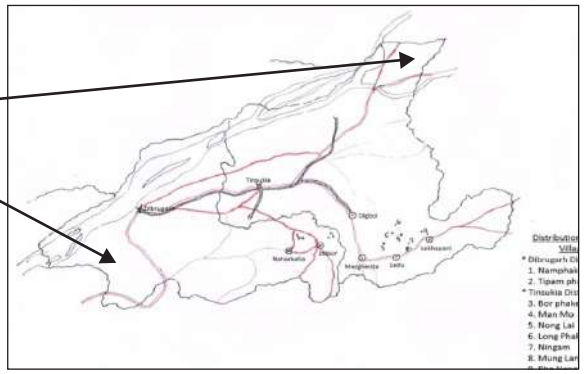

Fig. 2. Dibrugarh and Tinsukia, Assam 9 Phake villages: Nam Phake (1), Tipam phake, BarPhake (3), Man Mo (4), Nong Lai (5), Long Phake (6), Ning gam (7), Moung lang (8) and Pha Neng (9)

The present study was conducted in six Tai Phake villages of upper Assam, northeast India (Fig. 1). Two villages viz. Nam Phake and Tipam Phake are in Dibrugarh district while four villages (Bar-Phake, Man Mo, Ning-gam and Pha-Neng) are situated at Tinsukia district (Fig 2). The district falls under northeast Biogeographic zone and Brahmaputra valley and is situated in the south bank of mighty the Brahmaputra river. Bar Phake is the oldest Phake village in Assam. The Phake villages are usually located beside a river and dense forest which reflects their desire to live closer to nature.

2.2. Field survey and data collection

Information on ethnomedicinal practice and medicinal plants were collected from 31 informants, of which 10 were specialised traditional herbal practitioners (both men and women), (Fig. 10 & 12), following the semi-structured questionnaire method of Alexiades (1996). Selection of informants were based on general acceptance in the Phake society that local healers or traditional herbal practitioners (Chow ya) have better knowledge of medicinal plants than the common Phake people. Field work consists of data collection, documentation and photography. Prior Informed Consent has taken from the informants before data collection. The specialised practitioners always follow their own manuscripts that are inherited from generation to generation which are written in Tai language. Rest of the informants of Tai Phake have little knowledge on herbal treatment which they acquire orally from their elders of the society and also from their experience. Among the new generation, some are interested to study and try to preserve their traditional culture for future generation by publishing some articles and books. The information was tabulated and also analysed using quantitative methods to study the distribution of ethnomedicinal knowledge among the informants. During field study the informants (i.e. healthcare practitioners) accompanied us and identified medicinal plants in the field. The medicinal plants were processed following the techniques of Jain and Rao (1977) and then identified with the help of local floras (Kanjilal *et al.*, 1934-1940; Chopra *et al.*, 1956; Kirtikar & Basu, 1935; Islam, 1989; Prajapati *et al.,* 2003). Nomenclature of plants has been updated online from www.theplantlist.org. The plant specimens are now retained in the Department of Life Science and Bioinformatics, Assam University, Diphu Campus for further study. Among the practitioners structured questionnaires revealed the variation of knowledge through quantitative analyses by Direct Matrix Ranking method (Martin, 1995).

2.3. Data Organisation

The collected ethnomedicinal data were entered into Excel spread sheet and summarized using graphical statistical methods such as percentages. The habits of the plants have been placed under four categories namely trees, shrubs, herbs and climbers. Plant parts used by the healers are grouped under nine categories, i.e. leaves, root, bark, rhizome, stem, flower, aerial root, whole plant and fruit. The types of ailments are categorized into 22 disease conditions (Cook, 1995).

2.4. Quantitative analysis

Fidelity level [FL%] (Friedman *et al.*, 1986) is used to identify the most preferred medicinal plants by the key informants for treating certain ailment. It helps to quantify the importance of medicinal plant for a specific ailment. Higher FL value indicates the widely used medicinal plants than those that are less popular. FL value was estimated by the following formula-

FL= Ip/ Iu x 100

Where Ip is the number of respondents who utilized medicinal plants for a specific ailment and Iu is the total number of respondents who mention the same plant for any ailment.

Direct Matrix Ranking [DMR] (Martin, 1995) is used to compare the use diversity of given plant species based on the data collected from the respondents. Selected informants were asked to assign use value (5=best, 4= very good, 3= good, 2=less used 1=least used and 0= not used) to different plant species. The values (average scores) given to each medicinal plant

were summed up and ranked.

Consensus value for plant parts [CPP] (Monteiro *et al.*, 2006) measure the degree of agreement among informant concerning the plant part used and is calculated as follows-

CPP= Px/ Pt, where Px= number of times a given plant part was cited and Pt=total number of citation of all parts.

Importance values [Ivs] (Byg and Balsev, 2001) measures the proportion of informant who regard a species as most important and is calculated as follows -

IVs= nis / n, where nis= number of informant who consider the species s most important; n= number of total informants.

3. Results and Discussion

The study has been represented by the collection and documentation of 38 medicinal plants of 23 families in six villages for treatment of 22 ailments through 21 oral application and rest 12 were external application. For each species updated botanical name, voucher number, family, Tai Phake name, parts used, mode of application, diseases were reported. Among the informants, variations are to be found in use of plant parts. Leaves represent the highest number of used part in herbal medicine. Four indices viz. FL% and Ivs (Table 3), Consensus value for plant parts (Fig.3) and Direct Matrix Ranking (Table 2) were reported in the study and from the analysis; it is observed that the traditional practice of Tai Phake is somewhat exceptional rather than the other group of tribes. They use some rare species of medicinal plants namely *Aganosma dichotoma* K.Schum*, Premna corymbosa* L.*, Bombox ceiba* L. etc in cancer treatment, *Chrysopogan aciculatus* (Retzius) Trinius*, Imperata cylindrica* Beauv., aerial roots of *Ficus benghalensis* L. are used in asthma disease, *Eleusine indica* Gaertn. is used in urinary problem while *Eupatoria cannabinum* L. is used in antibacterial treatment etc. The results of Fidelity level and Importance value shows the frequent uses of some plants such as *Curcuma longa L., Clerodendron glandulosa* Lindley etc. which have highest value of Fl and IVs. *Piper longum* L. and *Zingiber officinale* Roxb. revealed cent percent value as both the plants are used almost all the medicines they prepare. The least values have been reported in *Premna corymbosa* (FL-09, IVs-.09), *Andrographis paniculata* (FL-36.3, IVs-.09) etc. due to their lesser use in particular ailments.

3.1. Diversity of Medicinal Plants

The 38 species of medicinal plants are used in the treatment of 22 different ailments. The highest represented botanical family is Compositae by 5 species (13%). Apocynaceae is represented by 4 species (10%), Zingiberaceae and Poaceae have 3species each (7%); Acanthaceae, Malvaceae, Leguminosae, and Verbenaceae each have 2 species (5%) while rest of the families are represented by single species each. The predominant family in the study area is Compositae which is in agreement with a general perception that the more common a plant taxon in an area, the greater is the probability of its popular use. The members of Compositae family have been found as more frequent ingredient in the treatment of various ailments because of its effective results. The plants of this family has antioxidant defence system such as catalase, glutathione peroxidase etc. (Suheda *et al.* 2014). Terpenoids and 83 new compounds have been obtained in seven different species of Compositae family (Yaoita *et al.* 2012) Different parts of the medicinal plants are used in herbal practice presented in the following order: leaves- 9(23%), root- 7 (18%), bark- 4 (10%), rhizome- 5 (13%), young shoots and stem- 2 (5%), flower-5 (13%), aerial root- 1 (1%), whole plant- 3 (7%) and fruit 2 (5%) (Fig.4).The variable use of parts shows that leaf has highest representation being used in 23% herbal formulations followed by roots and rhizomes have 18% use. Non experimental validation of these plant parts make easy to cure diseases. Bioactive chemical composition of leaves act as antibacterial, antifungal and antioxidant agents in different ailments (Prasad *et al.* 2016). Traditional healers use leaf parts as paste e.g. *Azadirachta indica* in small pox, skin diseases etc. or dried powder e.g. *Gymnema sylvestre* in diabetes (Muthu *et al.*2006). Tai

Phake practitioner use raw leaves in some treatment such as *Ricinus communis* and *Vitex negundo* leaf apply after heating in rheumatic pain, leaves of *Senna alata* use directly after heating in skin infection. The underground parts of plants have full of carbohydrate or starch constituents as well as protein compound due to which Tai Phake frequently use root and rhizome in herbal medicine and as food also. Many of the practitioner use rice washed water in medicine as it is composed of starch. 'Prasaplai' is a traditional common household drug in Thailand used in dysmenorrhea and it is made up of 50% of *Zingiber cassumunar* (Vannabhum *et al.*2016). The useful medicinal plants of Tai phake are collected from all types of locally available habitats such as herbs from kitchen garden, epiphytes from the nearest forest etc. Many medicinal plants are collected from home gardens as the local healers have been conserving some rare medicinally valued species in their personal kitchen gardens.

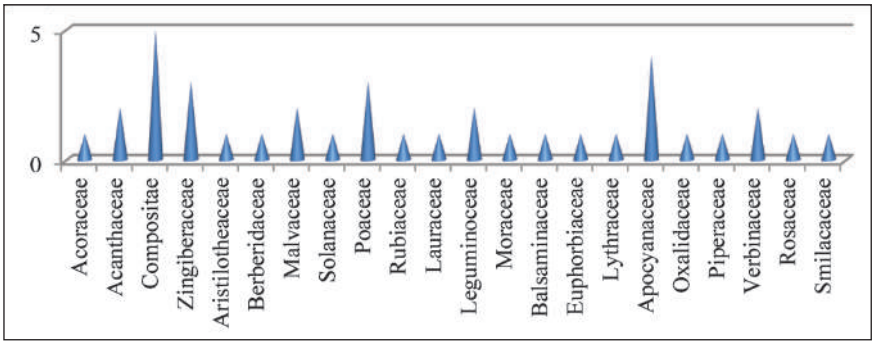

Fig. 3. Diversity of plant species used in different ailments

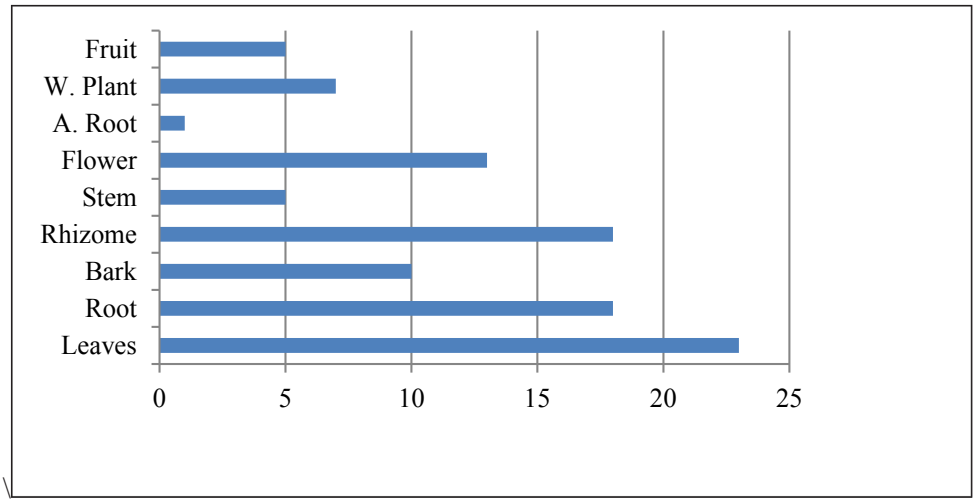

Fig. 4. Plant parts used in different formulations by the herbal practitioners

3.2. Variation of Ethnomedicinal Knowledge

The variations of medicinal knowledge among the practitioners have been statistically analysed employing some quantitative tools. The medicine men and women have empirical knowledge of medicinal plants of their surrounding environment. From the study, variations are observed in the uses of plant parts in different formulation of herbal medicine and the uses of plant species varied among the practitioners. These variations of medicinal knowledge are quantified through CPP value, Fidelity level, Importance value and Direct Matrix Ranking methods.

The CPP values of the plant parts which are used by the practitioners in different ailments vary in different species. The graphical representation of used plant parts proved that the leaves part has got highest preference as compared to the other parts. Leaves secured CPP value 0.23, followed by root 0.13, bark 0.1, stem and young twig 0.05, rhizome 0.13, flower and inflorescence 0.13, aerial root 0.01, whole plant 0.07whereas fruit has secured 0.05. The pie diagram differentiates the CPP value of plant parts.

The FL values of the recorded plants calculated based on use, reports which have been cited by 22 informants against a given ailment (Table 3). The analysis showed that the highest value of FL found in twelve different plants (100%) such as *Cleodendron glandulosa, Curcuma longa, Eupatorium cannabinum, Jatropha curcas, Lawsonia inermis, Piper longum, Senna alata* and *Zingiber officinale* followed by *Ageretum conyzoides, Smilax macrophylla, Vitex negund*o plants of 95%. *Premna corymbosa* has shown the least FL value only 9% which is used in cancer treatment. The highest FL value could be considered as high healing potential of those plants used against the corresponding diseases. It could also be targeted for further phytochemical investigation to identify the bioactive compounds.

The Importance values (IVs) of the same medicinal plants have been calculated and showed in the Table 3. The unit value represent the most important plant species that used by maximum informants. In this table, the highest value 1 is recorded in the plant species like *Ageratum conyzoides, Curcuma longa, Eupatorium cannabinum, Zingiber officinale etc.* against the ailments like cuts and bruises, sprain, antibacterial, cough and cold, respectively. The highest value of plant species highlights the therapeutic importance and the local traditional healers rely mostly upon those plants species.

Table 1. List of Informants

Sl. No.	Name of the practitioner	Village	Gender	Occupation	Age
1	Ai Lun Khong Weingken	Bor Phake	Male	Key medicine man	89
2	Late Ngi Mya Chang Gohain	Bor Phake	Male	Key medicine man	82
3	Late Cham Chang Gohain	Nam Phake	Male	Key medicine man	80
4	Am Paw Weingken	Bor Phake	Female	Key medicine woman	42
5	Late Am Khing Mya	Nam Phake	Female	Key medicine woman	80
6	Ngi Cha Kham Thoumong	Ning Gam	Male	Key medicine man	79
7	Ai Kya Mon Saton	Bor Phake	Male	Key medicine man	58
8	Ai Chung Chakhap	Ning Gam	Male	Key medicine man	82
9	Ye Ling Pomoong	Pha neng	Female	Key medicine woman	65
10	Ye Naw Chee Pomoong	Man mo	Female	Key medicine woman	83
11	Ngi Pe Thoun Gohain	Nam Phake	Male	Ex. Research Asst. DU	65
12	Amchon Gohain	Nam Phake	Female	Research Assistant, DU	57
13	Ai Moun Chakhap	Pha neng	Male	Secretary, All Assam Tai Phake Jatiya Parishad	67
14	Ai Janta Gohain	Nam Phake	Male	Aged Informant	79
15	Ngyang Kheit	Nam Phake	Female	Aged Informant	75
16	Am chao Khya Chakhap Weingken	Nam Phake	Female	Teacher & writer	60
17	Ekhya Gohain	Nam Phake	Female	Teacher	60
18	Paim Thi Gohain	Nam Phake	Male	Writer & servicemen	42

19	Cham Khyoun Thomoung	Tipam Phake	Male	Farmer	80
20	Ai Kya Phew Chakhap	Tipam Phake	Male	Retired Govt. employee	70
21	Ye Kham Hailung	Bar Phake	Female	Weaver	45
22	Ngo Kyo Let Hailung	Bar Phake	Male	Farmer	52
23	Ye Sawa Saton	Bar Phake	Female	Weaver	45
24	Ngi Than Gohain	Nam Phake	Male	Farmer, carpenter	48
25	Hom pya Chakhap	Bar Phake	Female	Weaver	26
26	Moun Ken Chakhap	Bar Phake	Male	Govt Serviceman	52
27	Ai Lot Gohain	Nam Phake	Male	Retired Govt. employee	78
28	Ong Kya Weingken	Nam Phake	Male	Serviceman	73
29	Ngi pheu Chouphom	Bar Phake	Male	Farmer	70
30	Ngi Mya Saton	Bar Phake	Male	Teacher	53
31	Nang Khrena Choupham	Bar Phake	Female	Housewife	67

3.3 Direct Matrix Ranking

Using quantitative ranking methods, ethnobotanist are able to calculate a numerical index which gives the local significance of a given plant (Cotton, 1996). Here the data are collected from7 practitioners and calculated in Direct matrix ranking method or preference ranking exercise conducted on 6 plant species which are used to treat cancer reveal that *Aganosma dichotoma* is the most preferred medicinal plant followed by *Premna corymbosa, Bombox ceiba* (Table-2). From this ranking method it is proved that *Aganosma dichotoma* is the most frequently used plant among the six medicinal plants for treatment of cancer in the area which highlights its highest efficacy potential among the six medicinal plant species cited by the informants.

Table 2. Direct Matrix Ranking list of 6 plant species

Medicinal Plants	**Informants**							**Score**	**Rank**
	A	B	C	D	E	F	G		
Aganosma dichotoma	5	4	5	5	4	5	4	32	1st
Premna corymbosa	4	5	4	2	3	3	4	25	2nd
Averhoa carambola	3	2	3	4	2	3	3	20	4th
Smilax macrophylla	3	2	4	2	3	2	1	17	6th
Oroxylam indicum	3	4	1	3	2	3	2	18	5th
Bombox ceiba	5	2	4	3	4	3	2	23	3rd

Informants cited as A to G, where A = Ai Lun Khong Weingken, B= Ngi Mya Chang Gohain,C =Am Khing Myam, D= Ai Kya Mong Saton , E = Ai Chung Chakhap, F = Ye Naw Chee Pomoong and G = Yea Ling Pomoong.

Table 3. Enumeration of the recorded medicinal plants and their FL% & IVs.

Scientific name/ family/ voucher no.	**Tai Phake name**	**Plant part**	**Formulation and application**	**Disease**	**FL%**	**IVs**
Acorus calamus L. [Acoraceae]; MPB-114, dtd. 17/3/13	Sang po	Rhizome	Dried powder mixed with *Cinnamomum camphora, Zingiber officinales, piper nigrum, alpinia galanga* , taken orally in the morning	Blood purify, acidity	68.1	0.4

Adhatoda vasica Nees [Acanthaceae]: MPB-113, dtd. 17/3/13 (Fig. 6)	Aoung	Flower, Rhizome	Dried powder of rhizome taken orally and flower used as curry	Cough	86.3	0.22
Ageratum conyzoides L. [Compositae]; MPB-321, dtd. 5/3/15	Ya-mean-mea	Leaf	Leaves are made into paste and applied locally	Cuts and bruises	95.4	1
Aganosma dichotomum K.Schum.,[Apocynaceae], MPB-108, dtd. 3/2/13	Maloti	Root	Dried powder along with *Premna corymbosa, Bombox ceiba, Oroxylum indicum, Prunas persica* ,taken orally	Cancer	100	1
Alpinia galanga (L.) Willd. [Zingiberaceae]; MPB-310, dtd. 4/2/15	Ya-hu –lung	Rhizome	Dried powder mixed with taken orally	Gastroenteritis	90.9	0.18
Alstonia scholaris R. Brown [Apocynaceae]; MPB-233, dtd. 12/2/14	Maii-tang	Root	Freshly prepared paste applied topically	Backache	45.5	0.13
Andrographis paniculata (Burm.f.) Nees[Acanthaceae]; MPB-106, dtd. 3/2/12		Fruit	Dried powder used with *Zingiber officinale, Piper nigrum, Ocimum sanctum*, taken orally	Malaria	36.3	0.09
Aristolochia tagala Cham. [Aristolochiaceae]; MPB-315, dtd. 15/2/15	Maa-ya	Inflore scence	Extract mixed with 7 fresh leaves of *Aegle marmelos* taken orally	Stomach problem	40.9	0.09
Berberis vulgaris L. [Berberidaceae]; MPB-285, dtd. 8/4/14	Ya-khing	Leaf	Leaves boiled with *Curcuma longa*, taken orally	High fever	27.2	0.13
Bombox ceiba L., [Malvaceae]; MPB-110, dtd. 4/3/13	Maii-new	Bark	Dried powder mixed with *Aganosma dichotoma, Premna corymbosa, Smilax macrophylla,* taken orally	Cancer	18.1	0.18
Calotropis gigantea R. Brown [Apocynaceae]; MPB-205, dtd. 1/12/13	Tun-pau	Leaf	Directly heated and apply locally	Sprain	86.8	0.18
Capsicum annum L. [Solanaceae]; MPB-210, dtd. 2/2/14	Makk-pheip-kong	Mature fruit	Fruit crashed and mixed with a small amount of salt and water in a bamboo tube and taken orally	Titenus	86.8	0.45
Chrysopogon aciculatus (Retz.) Trinius [Poaceae]; MPB-107, dtd. 4/2/12	Ya-hang-hung	Root	Dried powder mixed with aerial root of *Ficus benghalensis, tebernaemontana divaricata, Impereta cylindrica* and taken orally	Asthma	22.7	0.13
Cinchona officinalis L. [Rubiaceae]; MPB-222, dtd. 2/2/14	Phung-ma-ya-ja	Leaf	Leaves juice taken orally	Malaria	45.4	0.86
Cinnamomum sulphoratum Nees [Lauraceae]; MPB-118, dtd. 16/5/13	Lang-kyo	Bark	Dried powder mixed with *Premna corymbosa, aganosma dichotoma, Smilex macrophylla, Bombox ceiba* and taken orally	Cancer	50	0.36
Cleorodendron glandulosa Lindley [Lamiaceae]; MPB-261, dtd. 12/3/14 (Fig. 5)	Pata-khwai	Leaves, Young twig	Young twigs are made into curry and taken orally	Hypertension	100	0.9
Curcuma longa L. [Zingiberaceae]; MPB-295, dtd. 19/7/14	Khao-min	Rhizome	Made into paste and applied locally	Sprain	100	1
Eleusine indica (L.)Gaertn. [Poaceae]; MPB-298, dtd. 15/10/14	Ya-phak-khai	Whole plant	Plant extract taken orally	Urinary problem	63.6	0.18
Erythrina stricta Roxb. [Leguminosae] MPB-316, dtd. 15/2/15	Tun-pau	Bark	Made into paste and applied locally	Sprain	31.8	0.22
Eupatorium cannabinum L., [Compositae]; MPB-150, dtd. 23/10/13	Pha	Young twig	Made into paste applied locally	Antibacterial	100	1

Ficus banghalensis L., [Moraceae]; MPB-240, dtd. 12/2/14	Phak-tun-hai	Arial root	Dried powder boil in rice wash water in a bamboo tube with *Chrysopogon aciculata, Leucas asperaTebernaemontana divaricata, Imperata cylindrica* and taken orally	Asthma	22.7	0.22
Impatiens balsamina L.,[Balsaminaceae]; MPB-278, dtd. 2/4/14	Kou-nam	Root, leaf	Root and leaf paste mixed together, applied locally	Septic	50	0.36
Impereta cylindrica (L.) P.Beuav,[Poaceae]; MPB-115, dtd. 17/3/13	Kha	Root	Dried powder boil in rice wash water in a bamboo tube with *Chrysopogan aciculata,Leucas aspera*, taken orally	Asthma	50	0.09
Jatropha curcas L., [Euphorbiaceae]; MPB-111, dtd. 16/3/13	Paw	Young stem	Used as a tooth brush	Toothache	100	0.45
Lawsonia inermis L. *alba* Lamk , [Lythraceae]; MPB-239, dtd. 12/2/14	Mang-youm	Leaf	Made into paste and applied locally	Skin disease	22.7	0.13
Mikania micrantha Kunth; [Compositae]; MPB-348, dtd. 1/6/15		Leaf	Leaf paste taken locally	Cuts and wounds	54.5	0.13
Oxalis corniculata L.,[Oxalidaceae]; MPB- , 361, dtd. 10/7/15	Phak-sem-sem	Whole plant	Extract taken orally	Dysentery	90	0.5
Piper longum L., [Piperaceae]; MPB-201, dtd. 4/11/13	May-ya	Inflore scence	Dried powder mixed with *Acoras calamas, Cinnamomum camphora, Ziniber officinale* and taken orally	Blood purifier	100	0.22
Premna corymbosa L., [Verbenaceae]; MPB-234, dtd. 12/2/14	Sak-lang	Bark	Dried powder taken orally	Cancer	09	0.09
Prunas persica L. Batsch; [Rosaceae]; MPB-214, dtd. 2/2/14	Ma-mon	Root	Dried powder mixed with *Premna corymbosa, Aganosma dichotoma, Bombox ceiba* and taken orally	Asthma	18.1	0.18
Senna alata L., [Leguminosae]; MPB-232, dtd. 12/2/14 (Fig. 8)	Mau-la	Leaf	Seven leaflets are taken, heated and applied locally one by one	Skin infection	100	1
Smilax macrophylla Roxb., [Smilacaceae]; MPB-116, dtd. 17/3/13 (Fig. 7)	Ya kan khyan	Root, flower	Powder mix with *Aganosma dichotoma, Premna corymbosa, Oroxylum indicum* and taken orally, flower eaten as curry	Cancer	95.4	0.45
Spilanthes acmella Murr. [Composiate]; MPB-117, dtd. 12/4/13		Flower	Applied locally on toung	Tongue disease		
Tabernaemontana divaricata (L.)R. Brown [Apocynaceae[;MPB-401, dtd. 2/4/16	Khau-paii	Root	Powdered root mixed with *Chrysopogon aciculate, Ficus benghalensis,Imperata cylindrica* and taken orally	Asthma	40.9	0.13
Tegetes erecta L., [Compositae];MPB-390, dtd. 12/3/16	Pi-lu	Leaf	Leaves boil in rice washed water taken orally	Pneumonia	72.7	0.63
Urena lobata L., [Malvaceae]; MPB-246, dtd. 12/2/14 (Fig. 9)	Ya-Khat-loung	Whole plant	Extract taken orally	Gynaecological problem	36.3	0.18
*Vitex negund*o L., [Verbenaceae]; MPB-402, dtd. 2/4/16	Ya-pan	Leaf	Crushed leaves made into paste and applied locally	Backache	95.9	0.36
Zingiber officinale Roscoe [Zingiberaceae], MPB-305, dtd. 23/10/14	Khing-keng	Rhizome	Dried powder or raw rhizome taken orally	Cold and cough	100	1

4. Conclusion

The documentation of ethnomedicinal plants of the Tai Phake community has elucidated the rich culture of ethnomedicinal practices among the people. The present work is a preliminary quantitative study of ethnomedicinal knowledge of the traditional practitioners which provide better information on ethnomedicinal plants used by the Tai Phake people for treatment of different ailments. The traditional healing practice of the people is rapidly declining due to modernization of the ethnic people and degradation of natural plant resources. Ethnobotanical study among ethnic groups helps us to document less known or novel information, which otherwise would be lost with time. There is an urgent need to formulate suitable conservation strategy for naturally growing ethnomedicinal plants and to establish an eco-friendly relationship.

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Fig. 5. *Cleorodendron Colebrookianum Walpers*

Fig. 6. *Adhatoda vasica* Nees

Fig. 7. *Smilax macrophylla* Roxb.

Fig. 8. *Senna alata* L.

Fig. 9. *Urena lobata* L.

Fig. 10. Tai Phake Lady Practitioners

Fig. 11. Ai Lung Khong Weingken

Fig. 12. Buddha Bihar of Tipam Phake, the person Cham Khyoun Thomoung

Fig. 13. Soil erosion on the bank of the Burhidihing river

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