Pleione 10(1): 123 - 133. 2016. **ISSN: 0973-9467**

Ethnomedicinal plants of the*Tai Phake* tribe of Upper Brahmaputra Valley in Assam, India

Mamoni Phukan Borgohain[1], Robindra Teron and **Ajit K. Tamuli**

Department of Life Science & Bioinformatics, Assam University, Diphu Campus, Diphu 782462, Karbi Anglong, Assam, India

[1]*Corresponding author*: mamoni_borgohain@rediffmail.com

[Received 21.05.2016; Revised 23.06.2016; Accepted 27.06.2016; Published 30.06.2016]

Abstract

Ethnomedicine is one of the assets of the *Tai Phake* tribe of Upper Assam but their unique healing system has been overlooked by researchers. Medicinal plants and traditional healing practice of the Tai Phake is discussed here. Information was collected through semi-structured interview of seventeen traditional healers from nine Phake villages distributed in Dibrugarh and Tinsukia districts of Assam. This study documented 50 medicinal plants used in treatment of 36 ailments. Most medicinal plants are collected from wild habitats but professional healers take interest to preserve rare medicinal plants in homestead gardens. Though Tai Phake have rich heritage of healing system, distribution of ethnomedicinal knowledge is polarised. While knowledge of common ailments are freely shared among all members in the society, ethnomedicines involving treatment of major diseases like heart problems, cancer-like symptoms, diabetes and nerve diseases and strictly transmitted between healers only. One healer Late Nying Mya Chang Gohain of Namphake village has been reported to have cured a cancer patient with his herbal formulations containing ingredients of *Bombax ceiba*, *Premna corymbosa*, *Averrhoa carambola*, *Cinnamomum sulphuratum*, *Aganosma dichotoma* and *Smilax guianensis*. Ethnobotanical study can provides basis for new avenues for future pharmacological screening programmes that leads to natural drugs discovery.

Key words: Tai Phake, ethnomedicine, healers, medicinal plants, conservation

INTRODUCTION

Human have utilized plants as source of healing since antiquity. The healing properties of certain herbs or the different parts of the plant might have been discovered by accident and substantiated by trial and error method (Jain & Mudgal 1999). 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 multi-disciplinary system constituting the use of plants, medicinally, spirituality and the natural environment has been the source of healing for people for millennia (Lowe *et al.* 2000). The use of plants in traditional medicine is well known in rural areas as well as among urban population (WHO 2008). Several local and indigenous populations meet their ends from the practice of traditional medicines even in the present day (Kuru *et al.* 2012). Herbal medicines are found to be safer to a large extent and provide in the treatment of various health problems (Mitalaya *et al.* 2003). Nearly 8000 plants are found to be of ethnomedicinal importance (Anonymous 1994). Over 2000 ethnomedicines are newly identified as drug yielding plants and also about

7500 plants are used in traditional health practices mostly in rural and tribal dominating villages of India (Pushpagandan 1995). About 85 % of the people in rural India use traditional medicines that are used for health care (Ayyanar & Ignacimuthu 2005). In India, it is reported that approximately 8000 of 17209 species of plants in its flora have medicinal values in a range of communicable and non-communicable diseases (Basu 1994). Medicinal plants used in traditional medicines as a starting point in drug discovery has been gaining popularity due to successful results in previous adventures (Balick & Cox 1996; Fabriciant & Farnsworth 2001). Ethnomedicines have been practised around the world as source of healing and, in India, journals like *Indian Journal of Traditional Knowledge, Ethnobotany* and *Pleione* has accommodated numerous reports on medicinal practices of different ethnic groups from NE India (Das *et al*. 2007; Deorani & Sharma 2007; Sarkar & Das 2012; Singh & Teron 2015; Teronpi *et al*. 2015).

Tai Phake is the second largest among the six different Tai groups of Northeast India. They are mainly distributed in Upper Brahmaputra Valley in Assam state, particularly in Tinsukia and Dibrugarh districts (N.C. Gogoi 1995). Ethnomedicine is one of the assets of the *Tai Phake* people of Assam but their unique healing system has not been overlooked by researchers. Phukan (2005) stated that ethnobotany of the *Tai Phake* community has been hardly studied except for a few reports on other Tai groups like *Tai Ahom* (Dutta & Nath 1999), *Tai Khamti* (Gogoi 1995) and *Mishing* (Kalita & Boissya 2000). Today, *Tai Phake* ethnomedicine is diminishing due to rapid degradation potential habitats of medicinal plants and unwillingness of new generations to accept such practice. Acculturation in young generation and access of biomedicines has also contributed to discontinuation of some traditional medical practices. This demand for an urgent need to document their traditional healthcare practices and medicinal plants before those are lost forever. Documentation of traditional healthcare system and medicinal plant knowledge of the *Tai Phake* are objectives of the present work.

MATERIALS AND METHODS

The Study area: Field study was undertaken in nine Tai Phake villages of Upper Assam (Fig. 1). Two villages namely Nam Phake and Tipam Phake are in Dibrugarh district while seven villages (Bar-Phake, Man Mo, Nong-lai, Long-Phake, Mung-Lang, Ning-gam and Pha-Neng) are situated in Tinsukia district. The study area extends between latitude 27°29' N and longitude 95°01' E and with an average altitude of 111 m amsl and situated along the south bank of the river Brahmaputra. Bar Phake is the oldest Phake village in Assam. Tai Phake people are distributed among other tribal groups mainly the Singphou, Tai Khamtis, Tai Khamyang, Tea tribes and a few tribes of Arunachal Pradesh *viz*. Wangcho, Hrusso or Aka and Mishimi. The Phake villages are generally located beside a river and a dense forest, a reflection of their love for nature. The people practice customs and traditions; most of the inhabitants are mainly dependent on farming for sustenance and livelihoods. Ethnomedicine is still indispensable for their primary healthcare as people have almost no access to modern medicines particularly due to lack of road connectivity with the urban areas.

Field survey and data collection: Information on ethnomedicinal practice and medicinal plants was collected form seventeen traditional health practitioners (both men and women) following semi-structured method of Alexiades (1996). Selection of informants was based on general acceptance in the Phake society that local healers or traditional health practitioners have better knowledge of medicinal plants than the common Phake people. Practitioners accompanied us and identified medicinal plants in the field; observable morphological features of the plant, parts used and method of preparation utilization were recorded in field diary. The

collected voucher specimens were dried and pressed following techniques of Jain and Rao (1977) and identified with the help of local floras (Kanjilal *et al*. 1934-1940; Chopra *et al*. 1956; Kirtikar & Basu 1935; Islam 1989; Prajapat *et al*. 2003). Nomenclature of plants has been updated online from *www.theplantlist.org*. The Voucher specimens are now retained in the Department of Life Science and Bioinformatics, Assam University, Diphu Campus for further study.

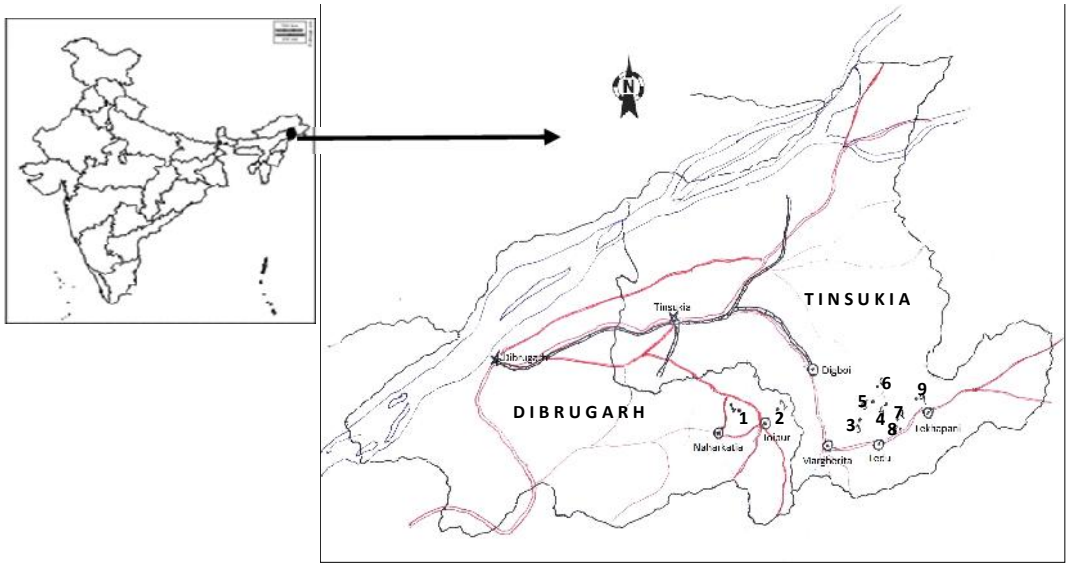

Figure 1. District map of Dibrugarh and Tunsikia districts of Assam showing distribution of Tai Phake villages where field study was undertaken [1. Namphake, 2. Tipam Phake, 3. Bor Phake, 4. Man Mo, 5. Nong Lai, 6. Long Phake, 7. Ningam, 8. Mung Lang, 9. Pha Neng]

RESULT AND DISCUSSION

Diversity of medicinal plants

The present study recorded 50 species of medicinal plants belonging to 50 genera under 36 families used in the treatment of 36 common ailments (Table 1). Updated botanical name, family, local name in Tai Phake dialect, parts used, formulations and diseases treated have been provided. The most represented botanical families are Lamiaceae and Compositae (4 spp. each); Zingiberaceae, Verbenaceae, Rubiaceae and Poaceae are represented by three species each; Liliaceae and Rutaceae each have two species while rest of the families have only one species each. Lamiaceae and Compositae are predominant in the study area 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. Members of the dominant families are *Mentha longifolia, Leucas aspera*, *Ocimum tenuiflorum* (Lamiaceae), *Tagetes erecta*, *Mikania micrantha*, *Ageratum conyzoides* and *Eclipta prostrata* (Fig. 11). In terms of the habit groups, 20 species (40 %) are herbs, 15 plants (30 %) are shrubs, 7 species (14 %) are small trees, 5 species (10 %) are tall trees while climbers are represented by only 3 (6 %) species (Fig. 2). This distribution of habit-groups is not surprising as local vegetation is also dominated by herbaceous plants. There is variability in the plant parts used in preparation of herbal formulations but leaf has highest representation being used in 17 herbal formulations (Fig. 3). Medicinal plants are collected from all types of locally available habitats. But, most raw materials are collected from nearby forests. Local healers have been conserving some rare medicinally valued species in their personal kitchen or homestead gardens.

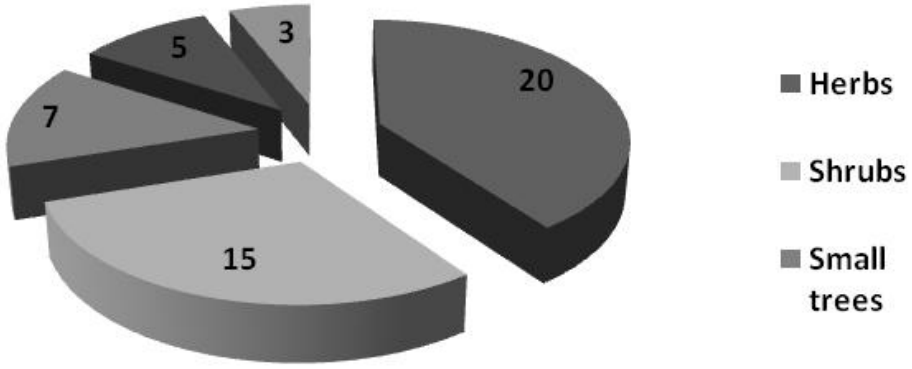

Figure 2. Distribution of habit-groups in *Tai Phake* ethnomedicinal plants

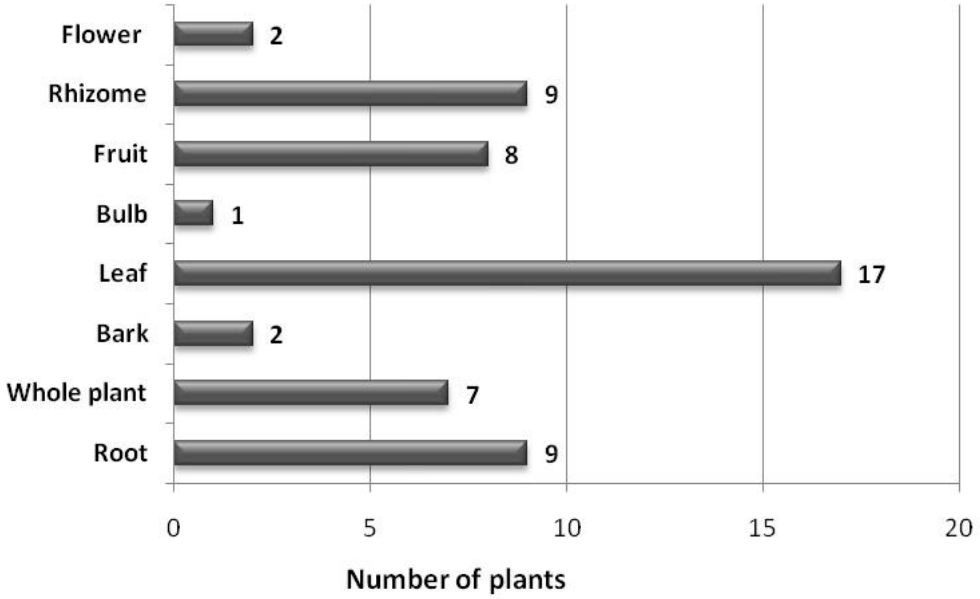

Figure 3. Distribution of plant parts used in *Tai Phake* ethnomedicines

Ethnomedicinal heritage of the *Tai Phake*

Ethnomedicine is very popular culture among *Tai Phake* people and they have been maintaining this practice along with other traditional customs and traditions. Transmission of medicinal knowledge however, is polarised. Although most of the elders possess knowledge on medicinal plants, only a few professional practitioners maintain their herbal treatment culture. The practitioners are locally known as *Mo-ya-Tai* or *Chow-Mo* or *Mo-lung* or *Sara*. The pattern of transmission of ethnomedicinal knowledge follows two approaches. While knowledge of common ailments are freely shared among all members in the society, ethnomedicine involving treatment of major disease like heart problems, cancer-like symptoms, diabetes and nerve diseases and are strictly transmitted between healers only. For this, traditional healers are said to possess better ethnomedicinal knowledge than the common mass. Ethnomedicinal practices of some *Tai Phake* healers have been briefly discussed below.

Table 1. Enumeration of medicinal plants used by the people of *Tai Phake* community

Plants [Family]; Voucher specimen	Tai Name	Parts used	Formulation and application
Acorus calamus Linnaeus [Acoraceae]; MPB-114, dtd. 16.3.2013	*Sang-po*	Rhizome	Dried powder mixed with other ingredients, taken orally as blood purifier and in acidity
Ageratum conizoides Linnaeus [Compositae]; MPB-221, dtd. 01.12.2013	*Ya-mean-mae*	Leaves	Paste applied locally in cuts and wounds
Allium sativum Linnaeus [Liliaceae]; MPB-276, dtd. 24.12.2013	*Polo-ching*	Bulb	Eaten raw in hypertension
Aloe vera **(**Linnaeus) Burman *f.* [Xanthorrhoeaceae]; MPB-253, dtd. 22.09.2013	*Lin-ngong*	Leaves	Paste apply instantly on burnt areas
Alpinia galanga (Linnaeus) Willdenow [Zingiberaceae]; MPB-310, dtd. 04.02.2015	*Ya-ho-loung*	Rhizome	Dried rhizome powder taken orally with other ingredients in gas problem
Alstonia scholaris R. Brown [Apocynaceae]; MPB-233, dtd. 12.04.2014	*Maii-tang*	Root	Freshly prepared paste apply locally in backache
Ananas comosus **(**Linnaeus) Merrill [Bromeliaceae]; MPB-300, dtd. 06.09.2014	*Maak-maha-nat*	Young leaves	Taken orally for repelling worms
Aristolochia tagala Chamisso [Aristolochiaceae]; MPB-315, dtd. 02.04.2015	*May-aa*	Inflorescence, leaf	mixed with *Aegle marmelos* leaves, - extracted juice taken orally in stomach problems
Averrhoa carambola Linnaeus [Oxalidaceae]; MPB-235, dtd. 12.04.2013	*Maak-phroung*	Fruit	Juice taken orally in jaundice
Basella alba Linnaeus [Basellaceae]; MPB-400, dtd. 13.02.2016	*Tihou-neng*	Young leafy twig	taken orally, cooked or green in constipation
Berberis vulgaris Linnaeus [Berberidaceae]; MPB-285, dtd. 23.10.2014	*Ya-khing*	Leaves	Boiled with *Curcuma longa* rhizome and taken orally in high fever
Calotropis gigantea R. Brown [Apocynaceae: Asclepiadoidae]; MPB-205, dtd. 23.10.2013	*Madar, Tun-pau*	Leaves	Heated and apply locally in sprain
Capsicum annum Linnaeus [Solanaceae]; MPB-210, dtd. 04.02.2014	*Maak-pheip-kong*	Mature fruit	Mature fruits are taken, crushed in a bamboo tube with small amount of salt and water and taken orally in tetanus
Carica papaya Linnaeus [Caricaceae]; MPB-401, dtd. 12.03.2016	*Koi-sung-pho*	Fruit	Eaten raw and as curry in constipation
Centella asiatica (Linnaeus) Urban [Apiaceae]; MPB-412, dtd. 05.04.2016	*Pnang*	Whole plant	Juice taken orally in indigestion
Chrysopogon aciculatus (Retzius) Trinius [Poaceae]; MPB-186, dtd. 03.02.2012	*Ya-hang-hung*	Root	Powdered root with other ingredients taken orally in asthma
Cinchona officinalis (Linnaeus) Ruiz [Rubiaceae]; MPB-222, dtd. 16.05.2013	*Phung-Ma-ya-ja*	Leaves	Juice taken orally in malaria
Citrus paradisi Macfadyen [Rutaceae]; MPB-256, dtd. 04.08.2013	*Maak-chum*	Fruit	Raw fruits or preserved in salt taken orally in dysentery

PLATE - I: Figs. 4 - 13. Some ethnomedicinal plants and medicine-men: 4. *Jatropha curcas*; **5.** *Aloe vera*; **6.** *Eupatorium* sp.; **7.** *Senna alata*; **8.** *Tabernaemontana divericata*; **9.** *Cinnamomum sulphuratum* (and Healer: Ngi Pe Thoun Gohain); **10.** *Eclipta prostrata*; **11.** *Smilax guianensis*; **12.** Late Nying Mya Chang Gohain; **13.** Aam Khyng Myn; **14.** Aai Mong Saton; **15.** Aam Nyang Weinkang;**16.** Aai Moun Chakhap

Plants [Family]; Voucher specimen	Tai Name	Parts used	Formulation and application
Cleorodendrum glandulosa Lindley [Lamiaceae]; MPB-261, dtd. 04.08.2013	*Pata-Khwai*	Leaves	Twigs are fried and taken orally for hypertension
Cocos nucifera Linnaeus [Arecaceae]; MPB-274, dtd. 14.01.2014	*Maak-oun*	Fruits	Kernel taken raw in acidity
Curcuma longa Linnaeus [Zingiberaceae]; MPB-295, dtd. 15.10.2014	*Khao-min*	Rhizome	Freshly prepared paste applied locally on wounds
Cynodon doctylon **(**Linnaeus) Persoon [Poaceae]; MPB-270, dtd. 14.12.2013	*Ya-ma-ne-cha*	Whole plant	Extracted juice taken orally against diuretic syphilis
Dillenia indica Linnaeus [Dilleniaceae]; MPB-301, dtd. 06.01.2015	*Makk-shan*	Fruits	Eaten raw or boil as laxative
Drymaria diandra Wildenow [Caryophyllaceae]; MPB-243, dtd. 16.04.2013		Whole plant	Taken as curry in sinusitis
Eclipta prostrata (Linnaeus) Linnaeus [Compositae]; MPB-324, dtd. 13.04.2015	*Ya-haun-khew*	Whole plant	Paste mixed with rice-wash water and taken orally in pneumonia and indigestion
Eleusine indica Gaertner [Poaceae]; MPB-298, dtd. 08.04.2014	*Ya-phak-khai*	Whole plant	Extract taken orally in urinary problem
Eryngium foetidum Linnaeus [Apiaceae]; MPB-336, dtd. 13.04.2015	*Pi-ki-khe*	Roots	Paste taken orally in stomach-ache
Erythrina stricta Roxburgh [Leguminosae]; MPB-315, dtd. 15.02.2015	*Tun pau*	Bark	Freshly prepared paste wrapped around painful area
Garcinia morella (Gaertner) Desrousseaux [Clusiaceae]; MPB-269, dtd. 05.03.2014	*Manag-sen*	Fruit	Taken orally for dysenteric diarrhoea
Impatiens balsamina Linnaeus [Balsaminaceae]; MPB-278, dtd. 02.04.2014	*Kou-nam*	Root, leaf	Root & leaf paste mixed with mustard oil and applied locally as antiseptic
Justicia adhatoda Linnaeus [Acanthaceae]; MPB-211, dtd. 02.11.2013	*Aoung*	Flower, root	Cooked flowers and powdered root taken orally in cough
Lawsonia inermis Linnaeus [Lythraceae]; MPB-239, dtd. 02.02.2014	*Mang-yoam*	Leaf	Paste apply locally in skin diseases
Leucas aspera (Willdenow) Link [Lamiaceae]; MPB-350, dtd. 12.05.2015	*Ya-hang-en*	Leaf	Extract taken orally and use as curry in indigestion
Mentha longifolia (Linnaeus) Linnaeus [Lamiaceae]; MPB-351, dtd. 10.07.2015	*Ta-je-hon*	Leaf	Paste taken orally as digestive
Mikania micrantha Kunth [Compositae]; MPB-348, dtd. 01.06.2015		Leaf	Paste apply locally on cuts and wounds
Mimosa pudica Linnaeus [Leguminosae]; MPB-365, dtd. 10.09.2015	*Toi-hoop*	Leaf, root	Both, leaf and root juice taken orally in stomach-ache
Murraya koenigii (Linnaeus) Sprengel [Rutaceae]; MPB-387, dtd. 09.12.2015	*Ya-phi-ko*	Leaf	Used as spice and taken raw orally in stomach-ache.

Plants [Family]; Voucher specimen	Tai Name	Parts used	Formulation and application
Ocimum tenuiflorum Linnaeus [Lamiaceae]; MPB-376, dtd. 07.09.2015	*Im-phim-num*	Leaf	Extract taken orally in cough
Oroxylum indicum (Linnaeus) Kurz [Bignoniaceae]; MPB-285, dtd. 05.06.2014	*Im-phim-num*	Bark, root	Powdered bark and root taken orally in cancer treatment
Oxalis corniculata Linnaeus [Oxalidaceae]; MPB-361, dtd. 10.07.2015	*Phak-chem-chem*	Whole plant	Extract taken orally in dysentery
Phyllanthus emblica Linnaeus [Phyllanthaceae]; MPB-388, dtd. 07.09.2015	*Maak-kham*	Fruit	Taken orally in dysentery
Piper nigrum Linnaeus [Piperaceae]; MPB-375, dtd. 07.09.2015	*Maak-pheit-lum*	Fruit	Powdered fruit taken orally in cough and cold
Premna corymbosa Linnaeus [Verbenaceae]; MPB-234, dtd. 02.02.2014	*Chak-lang*	Bark	Dried powder taken orally in cancer treatment
Prunus persica (Linnaeus) Batsch [Rosaceae]; MPB-241, dtd. 02.02.2014	*Ma-mon*	Root	Dried powder mixed with other ingredients taken orally in asthmatic trouble
Senna alata Linnaeus [Leguminosae]; MPB-233, dtd. 12.04.2013	*Mau-la*	Leaf	Seven leaves are taken, heated and apply one by one locally in skin infection
Tabernaemontana divaricata (Linnaeus) R. Brown ex Roemer & Schultes [Apocynaceae]; MPB-401, dtd. 02.04.2016	*Khow-paii*	Root	Powder taken orally in asthma with other ingredients
Tagetes erecta Linnaeus [Compositae]; MPB-390, dtd. 04.11.2015	*Pi-lu*	Leaf	Boiled with rice-wash water and taken orally in pneumonia
Urena lobata Linnaeus [Malvaceae]; MPB-246, dtd. 02.02.2014	*Ya-khat-loung*	Whole plant	Extract taken in gynaecological problems
Vitex negundo Linnaeus [Verbenaceae]; MPB-402, dtd. 12.03.2016	*Ya-pan*	Leaf	Paste apply locally in backache
Zingiber officinale Roscoe [Zingiberaceae]; MPB-305, dtd. 06.01.2015	*Khing-keng*	Rhizome	Raw or powdered rhizome taken orally as carminative

A lady ethnomedicine practitioner Late Aam Khing Mym (Fig. 13) of Namphake village had planted some rare medicinal plants in her garden including *Cinchona officinalis* (*Phung-Ma-Yaja*). She used *Justicia adhatoda* (*Auong*) and *Oxalis corniculata* (*Phak-Chem-Chem*) for the treatment of gynaecological problems. Sometimes different parts of same plants were used against different diseases, for example *Piper nigrum* (*Maak-Pheit-Lum*) and *Zingiber officinale* (*Khing-Keng*) for cancer, gastric problem, neurological problem and as blood purifier.

Another renowned practitioner Ngi Chakham Thomoung of Namphake village has planted many common medicinal plants in his homestead garden which are applied for different diseases, e.g. *Mikania micrantha* (cuts and wounds; Fig. 4), *Phyllanthus emblica* (dysentery), *Psidium gujava* and *Jatropha curcas* (toothache). Late Nying Mya Chang Gohain (Fig. 12) of Bar phake village had forty years of experience in herbal treatment. He claimed to have cured a cancer patient with his herbal formulation containing ingredients: *Bombax ceiba*, *Premna corymbosa*, *Averrhoa carambola*, *Cinnamomum sulphuratum*

(Fig. 7), *Aganosma dichotoma* and *Smilax guianensis* (Fig. 11). The latter two species have been rated as very important ingredient for cancer treatment by Gohain. The patient is said to be fully cured now.

Aai Kya Mong Sotan (Fig. 14) is a very popular practitioner among the inhabitant of Bar Phake village. He formulated different herbal medicines and most of the plants required for the medicines he collects from deep forests. Sotan explained the importance of one plant, *Tebernaemontana divaricata* (Fig. 8), which is used in several medicines such as in urinary problem, in asthmatic trouble, in cancer etc. Ailun Khong Weingkein (Fig. 15) of Bar Phake village prepared herbal medicine for treatment of asthma disease using seven plants namely *Ficus benghalansis, Prunus persica, Leucas aspera, Impereta cylidrica, Tebernaemontana divaricata, Capsicum annum* and *Chrysopogon aciculatus*. There are reports of these plants being used in other parts of the country for asthma and phytochemical screening of also revealed presence of secondary metabolites effective for asthma (Wadood *et al*. 2013; Jadav *et al*. 2014). According to Weingkein *Ocimum tenuiflorum* can be used in 16 different diseases. Ethnomedicines for urinary problem is another significant aspect of Phake healing system. It is notable that the herbal medicines are prepared with rice-washed water instead of plain water. *Justicia adhatoda* and *Eleusine indica* are generally taken in urinary problem. *Eclipta prostrata* and *Tagetes erecta* are used in pneumonia; the latter plant is also used in cuts and wounds. *Jatropha curcas* (*Paw*) (Fig. 4) they also use in toothache. In Pha Neng village, where much information on medicinal plants has been collected from Aai Moun Chakhap (Fig. 16), bark of *Calotropis gigantea* is heated and wrapped around the affected area suffering from sprain. For management of sepsis, herbal formulation is prepared by crushing leaves of *Impatiens balsamina* and *Polygonum* sp., a drop of mustard oil is added and then warmed before application. Leaves of *Senna alata* (Fig. 7) are used on eczema.

Plants play an indispensable role in the Naming Culture of Tai Phake. The white threads tied to newborn babies are first treated with a mixture of twigs of *Eupatorium cannabinum* (Fig. 6) and *Curcuma longa*. This practice has health benefit as the plants have antibacterial properties.

Ethnomedicines are administered in different forms. The formulations are given as oral therapy, applied locally, bath, massage and as aroma therapy. Most drugs are utilized in the fresh state as decoction, infusion, poultice, etc. Generally pounded ingredients are administered directly and rarely in form of dried pills. Dry plant parts are usually made into powdered mixer. Barks and roots of certain plants of medicinal importance are chewed and suck. The practitioners never perform any surgery but some use chants or incantations in preparation of certain remedies for stomach-ache, backache and burns.

CONCLUSION

The present preliminary study elucidated rich ethnomedicinal culture and knowledge of medicinal plants of the *Tai Phake* community. But, their traditional healing practice is gradually declining, the major impediments being globalisation and degradation of natural plant resources. Thus, conservation of medicinal plants is key for continuation of age-old *Tai Phake* medical tradition. There is urgent need of conservation to protect the natural plant resources as well as the traditional healthcare practices. Ethnobotanical study among ethnic groups help us to document less-known or novel information, which, otherwise would be lost with time. Such study provides basis for new avenues in future pharmacological screening programmes that leads to natural drugs discovery.

Acknowledgements

Authors are grateful to all informants and people of *Tai Phake* villages who shared their valuable knowledge and experiences with us. Special thanks are extended to the traditional practitioners of the community for sharing their empirical knowledge of herbal medicine given to us. They thank the Institutional Biotech Hub (funded by Department of Biotechnology, Govt. of India), Department of Life Science & Bioinformatics for infrastructural support.

LITERATURE CITED

Alexiades, M.N. 1996. Collecting ethnobotanical data: An introduction to basic concepts and techniques. In: M.N. Alexiades (ed.), *Selected Guidelines for Ethnobotanical Research*: *A Field Manual*, The New York Botanical Garden, Bronx, New York. Pp. 53 – 94.

Anonymous 1994. *Ethnobiology in India: a status report of All India Co- ordinate Research Project on Ethnobiology*. Ministry of Environment and Forest, Government of India, New Delhi.

Ayyanar, M. & Ignacimuthu, S. 2005. Ethnomedicinal Plants used by the tribals of Tirunelveli hills to treat Poisonous bites and skin Diseases. *Indian J. Trad. Knowl.* 4: 229 – 236.

Balick, M.J. & Cox, P.A. 1996. *Plants, People and Culture: The Science of Ethnobotany*, Scientific American Library, New York.

Basu, S.K. 1994. Health Problems and health care of the tribal population of India. In: N. Mahanti (ed.), *Tribal Economy, Health and Wasteland Development*. Inter-India Publications, New Delhi.

Chopra, R.N.; Nayar S.L. & Chopra, I.C. 1956. *Glossary of Indian Medicinal Plants*, CSIR, New Delhi.

Das, A.P; Ghosh, C.; Sarkar, A. & Biswas, R. 2007. Ethnobotanical studies in India with Notes on Terai- Duars and Hills of Darjiling and Sikkim. *NBU J. PL. Sci.* 1: 67 – 83.

Deorani, S.C. & Sharma, G.D. 2007. *Medicinal plants of Nagaland*. Bishen Singh Mahendra Pal Singh, Dehra Dun.

Dutta, M. & Nath, S.C. 1999. Ethno-medico-botany of the Tai-Ahoms of Assam, India. *J. Econ. Tax. Bot.* 23(2): 591 – 598.

Fabricant, D.S. & Farnsworth, N.R. 2001. . The value of plants used in traditional medicine for drug discovery. *Environ. Health Perspect.* 109 Suppl 1: 69 – 75.

Gogoi, P. 1968. *The Tai and Tai kingdom, with fuller treatment of the Tai Ahom kingdom in the Brahmaputra valley*. Guwahati University press, Guwahati.

Gogoi, N.C. 1995. *Morphological Study of Tai Phake Language of Assam*. Ph D Thesis, Dibrugarh University, Dibrugarh, Assam

Gogoi, P.D. 1995. *Ethnobotany of Tai Khamti's of Assam and Arunachal Pradesh*. Ph.D. Thesis, Gauhati University, Assam.

Islam, M. 1989. The aquatic and Marshland flora of Assam. *J. Econ. Tax. Bot.* 13(2): 461 - 491.

Jadav, M.; Chaterjee, S.; Gupta, S.K.; Watal, G. 2014. Preliminary phytochemical screening of six medicinal plants used in traditional medicine. *Intn. J. Pharm. Sci*. 6(5): 539 – 542.

Jain, S.K. & Mudgal, V. 1999. *A Handbook of Ethnobotany,* Bishen Singh Mahendra Pal Singh, Dehra Dun.

Jain, S.K. & Rao, R.R. 1977. *A Handbook for field and herbarium methods,* Today & Tormmorow Publishers, New Delhi.

Kalita, D. & Boissya, C. L. 2000. Some folk uses of plants by Mishing tribal of Assam. *Vasundhara* 5: 79 - 84.

Kanjilal, U.C.; Das, A.; Kanjilal, P.C. & De, R.N. 1934–1940. *Flora of Assam*. Vols. I - IV. Govt. of Assam, Shillong.

Kirtikar, K.R. & Basu, B.D. 1935. *Indian Medicinal Plants* I. Allahabad. [Reprint: 1995. International Book Distributors and Publishers, Dehra Dun, India].

Krippner, S. 2003. Models of Ethnomedicinal Healing. Paper Presented at the *Ethnomedicine Conference,* Munich, Germany. April 26 – 27 and October 11 – 12.

Kuru, S.; Viji Senthilmurugan, G.; Pandiselvam, S. & Karuppuraja, S. 2012. Ethnomedicinal Plants used by the Rural people in Thiruppachethi village of Sivagangai District, Tamil Nadu, India. *J. Biosci. Res.* 3(1): 47 – 51.

Lowe, H.; Payne-Jackson, A.; Beckstrom-Sternberg, S.M. & Duke, J.A. 2000. *Jamaica's Ethnomedicine: Its potential in the healthcare system*. Canoe Press; University of the West Indies, Kingston, Jamaica.

Mitalaya, K.D.; Bhatt, D.C.; Patel, N.K. & Didia, S.K. 2003. Herbal medicines used for hair disorders by tribals and rural folk in Gujarat. *Indian J. Trad. Knowl.* 2: 389 – 392.

Phukan, S. 2005. *The Phake, a book on the history and culture of the Tai Phake*, Guwahati, Assam.

Prajapati, N.D.; Purohit, S.S.; Sharma, A.K. & Kumar, T. 2003. *A Handbook of Medicinal Plants*, Agrobios (India), Jodhpur.

Pushpagandan, P. 1995. Ethnopharmacology of *Trichopus zeylanicus*- The ginseng of Kerala-A review, In: P. Pushpagandan, Uff Nyman & V. George (eds.), *Proceeding of the first National Conference on Ethnopharmacology*. Visual Security Printing Enterprises Pvt. Ltd., New Delhi.

Sarkar, A. & Das, A.P. 2012. Contribution of forest floral elements in rural livelihood: a study of Jayantia, Buxa Tiger Reserve, West Bangal, India. *Pleione*, 6(1): 132 – 140.

Singh, A.B. & Teron, R. 2015. Diversity of Wild edible plants used by the Angami-Naga, Kohima District of Nagaland, India. *Pleione* 9(2): 311 – 324.

Teronpi, Ni-et; Teron, R. & Tamuli, A.K. 2015. Wild plants of horticultural importance from the Singhason Hills in Assam, *Pleione* 9(2): 289 – 300.

Wadood, A.; Ghufran, M.; Jamal, S.B.; Naeem, M.; Khan & *et al*. 2013. Phytochemical analysis of Medicinal plants occurring in Local Area of Mordan. *Biochem and Biochem* 2: 144.

WHO 2008. World Health Organisation Fact Sheet No.134: Traditional Medicine.

www.theplantlist.org