

Ethno-medicinal Plants of India, Thailand and Vietnam

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ABSTRACT India and South-East Asia are wonderful laboratories for Anthropological and Ethno-botanical studies. The objective of this paper is to examine the ways in which thirty common medicinal plants are used in Western India, in the Northern Provinces of Thailand and in Viet Nam. In this research, the primary data was collected by the author from India and Thailand and this information was compared with secondary data obtained from a WHO regional publication executed in conjunction with the Institute of Materia Medica in Hanoi, Viet Nam. This pictorial scientific book consisting of 410 pages is entitled, "Medicinal Plants in Viet Nam". In this research a random study of 30 plant species were selected for study. The three most common diseases, ailments or conditions cured by the same 30 plant species in the three countries are as follows: Anthelmintic, Antipyretic and Rheumatism in India; Flatulence, Antipyretic and Skin diseases in Thailand and Diarrhea, Cough and Antipyretic in Viet Nam. This shows that in all the three areas studied, Antipyretic, or a substance to reduce fever was the most common. It is also interesting to note that the traditional healers in their respective countries reported that of the 30 species studied, they could cure 281 diseases or ailments in India, 163 diseases or ailments in Thailand and 298 diseases or ailments in Viet Nam. The scope for further research is incredible and the need for a global movement for the conservation of medicinal plants and the revitalization of the native health traditions of local communities is vital.

INTRODUCTION

"Health is a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity" (WHO 1948). In support of this well-known WHO definition of health we find that Ayurvedic medicine which is practiced in India for the past 5,000 years places equal emphasis on body, mind, and spirit, and strives to restore the innate harmony of the individual. (Trivieri 2002). On examining these two views we find that health does not only mean, that we need to look after the physical body, but we need to take care of the human psyche or mind as well. It also emphasizes the importance of our ability to get along with other people which in sociological terms would be the immense value of our cordial interactions and cultural cohesiveness with people who live around us.

As we understand it today, diseases and ailments are indivisible comrades of life. They strike the urban and rural, rich and poor alike and often they are no respecter of status, class or community. There is sufficient evidence to show that early man has been on the search for ways and means of protecting their kinsmen from diseases through the use of plants. Man's relationship with plants as a source of medicine is as old as the history of mankind and is much older than the advent of the codified systems of medicine. A discovery of the remains of eight Angiosperms

or flowering plants found in the grave of a Neanderthal man; during the archaeological excavations at the Shanidar Cave burial ground in northern Iraq; points to the use of plants for health care during the early pre-historic times. Seven of these eight angiosperms are still being used in traditional medicine in that region (Pushpangadan et al. 1995).

Many recent studies have ratified the belief that the environment or nature has for long been a very important source of medicines. A good number of our modern drugs have been isolated from plants, based on their use in traditional medicine (Cragg and Newman 2001). In fact plants have formed the basis for traditional medical systems that have been used for thousands of years in countries with ancient civilizations like, China (Chang and But 1986), India (Kapoor 1990; Parrotta 2001) and Thailand (Farnsworth and Bunyapraphatsara 1992; Subchareon 1998). The use of plants in traditional medicine in other countries too have been extensively documented (Ayensu 1981; Schultes and Raffaul 1990; Jain 1991; Arvigo and Balick 1993; Iwu 1993; Gupta 1995). Medicinal plants are found on the entire surface of planet earth and sometimes even at our door steps but we are not aware of it. Plant taxonomists tell us that of the total range of medicinal plants available to mankind, 33% are trees, 32% are herbs, 20% are shrubs, 12% are climbers and 3% are classified as smaller plants (Kurian 2003).

India, Thailand and Viet Nam have an abundance of diverse natural resources and a large percent of the population live and work in the countryside. Many tribal folk also referred to as ethnic minorities are often scattered in the forest highlands and they have no access to modern medicines. As such, for centuries they have developed their own traditional folk medicine which has been time-tested and proved to be very effective (WHO 1990).

In India, experts in the field of Botany tell us that of the available medicinal flora, 2500 species are used by the tribal folk who mostly live in rather inaccessible areas. Ayurveda, Siddha, Tibetan and Unani systems of medicine together use 1800 medicinal plants that belong to 188 botanical families. Over the centuries, the most effective remedies have been selected by empirical reasoning and by experimentation. These have now become part of the materia medica and ethnomedicinal traditions in India (Parrotta 2001).

A closer look at the Indian scene brings to light some interesting facts. Of the 15,000 or more plant species, India's ethnic communities use 7,500 plant species as medicine across the country. The folk healers include over 600,000 *dais* who are the traditional birth attendants. These *dais* manage about 90% of child births in rural areas even today. Moreover, spread across the country there are about 300,000 general folk healers; 60,000 bonesetters and the same number of *Visha Vaidyas* who treat scorpion and poisonous snake bites. Other specific conditions like mental disorders, skin problems, eye diseases, respiratory conditions etc., are attended to by about 1,000 'specialists' in each category.² It is estimated that more than 70% of the rural population of India rely upon herbs for health care and millions of housewives and forest dwellers are traditional carriers of knowledge related to home remedies. This vast body of knowledge related to primary health care is carried orally by practitioners and passed on to the next generation (Pushpangadan et al. 1995).

Historical studies have shown that Thai traditional medicine was adapted from the Indian Ayurvedic system which was introduced 700-1000 years ago. The Thai system of traditional medicine was compiled during the reign of Kings Rama I and II of Ratanakosin in the 18th and early 19th century. The medicinal prescriptions were recorded on the stone plaques and walls of the

Wat Poh temple and under King Rama V these were revised and published. This serves as the basis for the Thai traditional medicine of today (De Padua et al. 1999).

Like India and Thailand, Viet Nam too has been blessed with a great variety of medicinal plants. Surveys have brought to light that there are 1863 species of medicinal plants in Viet Nam. Some of these plants are common, many are valuable and some are rare and endangered. Viet Nam has adopted a policy of developing a national system of medicine and pharmacy by integrating the modern and traditional systems. It is encouraging to note that a good number of monographs on medicinal plants have already been published.

In this paper, while the researcher emphasizes the use of plants akin to Ayurveda, he does not undermine in any way the use of Allopathy, Homeopathy, Unani, Siddha, Tibetan, Chinese and other complementary medical practices. Neither does he debate the surgical skills of physicians. In fact, the researcher believes there is a need to encourage the use of multiple medical systems as also envisaged by many of my colleagues.

In contrast to modern medicine, traditional medicine attempts to embody a holistic approach, that is, of viewing an individual in his totality including his position in society and the ecological environment. It emphasizes the view point that ill health or disease is brought about by an imbalance or disequilibrium of man's physiological, psychological, behavioral, ecological and spiritual environment and not just by an external pathogenic agent be it a micro-organism or another causative agent. Modern medicine is more concerned about the cure of diseases but remains rather indifferent to health preservation. It is in this context that the relevance of the holistic approach of the traditional health care practice becomes important.

Most of the information on diseases, ailments or conditions collected from the medicine men in rural India and Thailand have been restudied and reevaluated with the help of experts in the field of herbal medicine, libraries and herbariums in both the countries, specialists from the botanical survey of India and scientists from the drug research institutes in India (Kurian 2004, 2007, 2010). However, as the plants studied in Viet Nam comes from a well documented source, namely the WHO publication; the need for further scrutiny was not warranted.

MATERIAL AND METHODS

In keeping with the appeal of the World Health Organization to 'save plants to save lives' this research project was taken up to carry out a comparative study of thirty common medicinal plants that were administered by traditional healers in specified areas of three countries. The areas chosen for study were in the Maharashtra State of western India, Chiangmai and Chiangrai provinces of northern Thailand and Hanoi of northern Viet Nam. The latitude, longitude and altitude in the three locations are presented in the Table 1.

Table 1: Geographical features

<i>Region</i>	<i>Latitude</i>	<i>Longitude</i>	<i>Altitude</i>
Maharashtra, India	20.00 N	76.00 E	300-1400 m
Chiangmai and Chiangrai, Thailand	18.47 N	98.59 E	300-2565 m
Hanoi, Viet Nam	20.79 N	105.82 E	0-3143 m

It should be made clear that the author had collected primary data from India (1998) and Thailand (2010) and this data was compared with secondary data obtained from a WHO regional publication executed in conjunction with the Institute of Materia Medica in Hanoi, Viet Nam. It should also be made clear that for identification of plants, the Bentham and Hooker system of classification was used. Digital documentation of all the plants listed in this study could be provided as and when it is called for.

After living amidst the tribal folk for several months, building respect and rapport with the traditional healers in the local areas, after considering all ethical issues like benefits of the findings to the local people and due considerations of the government officials in the region the methods employed in collecting the needed data are as follows:

- ♦ The primary sources of information were the traditional healers like the:
 - Vaidus
 - Bhagats
 - Medicine men
 - Herbal doctors
 - Ayurvedic physicians
 - Phytotherapists
- ♦ The secondary sources of information are:
 - Technical Books on the Flora of India, Thailand and Viet Nam

- Books on Medicinal Plants written by different authors
- Personnel from the Botany and Pharmacology Departments of the Universities in India and Thailand
- Personnel from the Botanical survey Departments in India, the Forestry Departments in Thailand and the Herbaria in the two countries.
- Personnel and tests carried out by the Drug Research Institutes

The data collection in India and Thailand incorporated the following objectives:

- ♦ To identify the medicinal plant species with the help of the traditional healers, taxonomists and the available secondary data.
- ♦ To ascertain the plant part that was used as medicine.
- ♦ To learn about any dietary restrictions that may be imposed with the intake of herbal medicine.
- ♦ To find how two or more plant species could be used together for a more efficient effect.
- ♦ To determine the methods of preparing the medicine, decoction or infusion before its use.
- ♦ To decipher the correct methods of administering the herbal medicine.
- ♦ To make a study of the recommended doses.
- ♦ To study about the after care practices, if any.
- ♦ To verify the precautionary methods of medicinal plant administration to expectant mothers.
- ♦ To make a list of all the plants that contains dangerous levels of alkaloids or poisons.
- ♦ To confirm the active ingredients found in the medicinal plants with the help of the drug research institutions and other scientists.

RESULTS AND DISCUSSION

A few authorities estimate that we have 8-10 million plant species in the world. What do we know about them? We have some idea of only 1.4 million plant species and the rest of it is unknown. This research is a small step towards understanding our ethno-medicinal environment a little better.

A laymen's classification of the thirty plants studied showed that there were four trees, nine shrubs, fourteen herbs and three climbers. Looking at the general trend of the flora, this appears to be a normal distribution of the plants in these three countries. From the ecological point of view, all thirty plants could be classified as mesophytes that require only moderate amount of water and do well in warm climates.

This study showed that the 30 plants discussed in this paper belonged to twenty-two plant families with two or more species belonging to five of the major plant families. The dominant plant families occurring more than one time were: Apocynaceae (4), Lamiaceae or Labiata (3), Fabaceae or Leguminosae (2), Malvaceae (2), and Piperaceae (2). The other seventeen plant families were represented by only one specimen. The parts that were used as medicine ranged from one specific part like, seed or bulb to more than one plant part and sometimes even the whole plant was used (Table 2).

Table 3 gives frequency distribution of common diseases and plants used as medicine in the three countries gives the names and definitions of 28 common diseases, ailments or conditions that were cured by the traditional healers using the 30 plant species that were studied in this paper. With reference to the frequencies or the number of plants that were used for cure in the three countries for the above mentioned 28 diseases or ailments, it is interesting to note that Antipyretic which is a substance that reduces fever in humans was the most common ailment for which they had 12 plant species known to

them in India, 7 plant species known to them in Thailand and 10 plant species known to them in Vietnam, making a total of 29. The second common ailment as shown in Table 3 is Diarrhea characterized by abnormal and frequent fluid bowel movements. The frequencies are as follows: India 8, Thailand 5, and Viet Nam 11, making a total of 24. Stomach ache with 23 and flatulence with 23 is next in line followed by Anthelmintic 20 and Rheumatism 19. Looking at the totals in the last horizontal row, it is interesting to note that the traditional healers in India were aware of 137 plant species, the traditional healers in Thailand were aware of 82 plant species and the traditional healers in Viet Nam were aware of 125 plant species that could cure the 28 common diseases that are listed in Table 2. It is worth commending the traditional healers in the three countries for having identified and studied in all 344 plant species that could cure 28 of the common diseases, ailments or conditions. (Fig. 1). The very fact that the traditional healers are aware of so many human diseases and the variety of plant species that can cure these diseases tell us that they have been keen observers of "Mother Nature" and they have provided great medical help to their respective communities.

A closer examination of the outstanding features found in Table 3 brings to light the following facts:

1. The plants *Nelumbium speciosum* and *Ocimum sanctum* had absolutely no common uses among the three countries.
2. There were seven plant species that showed common uses between India, Thailand and Viet Nam.

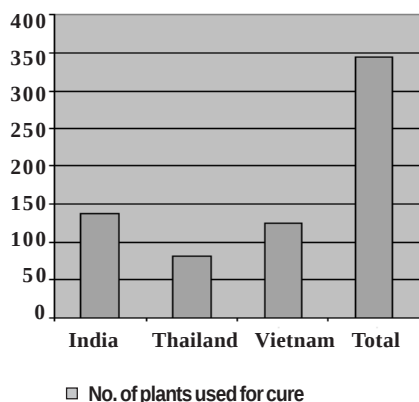


Fig. 1. Distribution of medicinal plants in the three countries

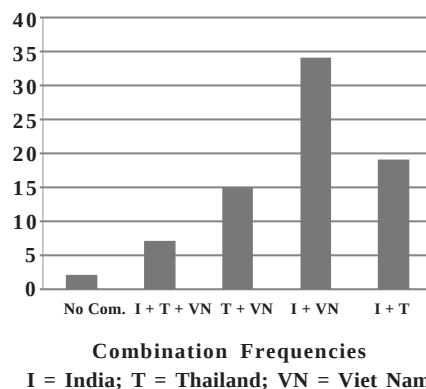


Fig. 2. Histogram with combination frequencies in the three countries

Table 2: Medicinal plants, family names and plant parts used

S. No.	Botanical name and authority	Family name	Plant parts used
1.	<i>Abrus precatorius</i> L.	Fabaceae/Leguminosae	Roots/Stem/Leaves/Seeds
2.	<i>Abutilon indicum</i> L.	Malvaceae	The Whole Plant
3.	<i>Acorus calamus</i> L.	Acoraceae/Araceae	Rhizome/Leaves
4.	<i>Allium sativum</i> L.	Alliaceae/Liliaceae	Bulbs
5.	<i>Alpinia galangal</i> Willd.	Zingiberaceae	Rhizomes
6.	<i>Alstonia scholaris</i> L.	Apocynaceae	Bark/Leaves/Latex
7.	<i>Andrographis paniculata</i> Nees.	Acanthaceae	The Whole Plant
8.	<i>Cassia alata</i> L.	Fabaceae/Leguminosae	Leaves
9.	<i>Cassia tora</i> L.	Caesalpinaceae	Leaves/Roots/Seeds
10.	<i>Catharanthus roseus</i> L.	Apocynaceae	Roots/Leaves
11.	<i>Centella asiatica</i> L.	Apiaceae/Umbelliferae	The Whole Plant
12.	<i>Cymbopogon citrates</i> DC	Poaceae/Gramineae	The Whole Plant/Oil
13.	<i>Cyperus rotundus</i> L.	Cyperaceae	Roots/Rhizome
14.	<i>Datura innoxia</i> L.	Solanaceae	Leaves/Flowers
15.	<i>Hibiscus mutabilis</i> L.	Malvaceae	Leaves/Flowers
16.	<i>Holarrhena antidysenterica</i> Wall.	Apocynaceae	Bark/Leaves/Flowers/Seeds
17.	<i>Mentha spicata</i> L.	Lamiaceae/Labiatae	The Whole Plant
18.	<i>Morus nigra</i> L.	Moraceae	Bark/Leaves/Fruits
19.	<i>Nelumbium speciosum</i> Willd.	Nymphaeaceae	The Whole Plant
20.	<i>Ocimum sanctum</i> L.	Lamiaceae/Labiatae	The Whole Plant
21.	<i>Orthosiphon aristatus</i> Benth.	Lamiaceae/Labiatae	The Whole Plant
22.	<i>Piper betle</i> L.	Piperaceae	Leaves/Roots
23.	<i>Piper nigrum</i> L.	Piperaceae	Berries/Leaves
24.	<i>Plantago major</i> L.	Plantaginaceae	The Whole Plant
25.	<i>Punica granatum</i> L.	Punicaceae	The Whole Plant
26.	<i>Quisqualis indica</i> L.	Combretaceae	Seeds
27.	<i>Ricinus communis</i> Linn.	Euphorbiaceae	Leaves/Seeds and Oil.
28.	<i>Strychnos nux-vomica</i> Linn.	Loganiaceae	Fruits/Seeds/Leaves
29.	<i>Thevetia peruviana</i> Pers.	Apocynaceae	Bark/Seeds/Leaves
30.	<i>Vitex negundo</i> L.	Verbenaceae	Roots/Bark/Leaves/Fruits

- There were fifteen plant species that showed common uses between Thailand and Viet Nam.
- There were thirty-four plant species that showed common uses between Indian and Viet Nam.
- There were nineteen plant species that showed common uses between India and Thailand.

It is interesting to note that of the five combinations depicted in Figure 2, the traditional healers in India and Viet Nam had the largest number of plant species that were used in common to cure different diseases, ailments or conditions.

Some of the detailed and fascinating findings in the present study are brought to light in Table 4. Table 4 presents the thirty plant species and their medicinal uses that were studied in India, Thailand and Viet Nam. Since the medicinal uses by the traditional healers in the three countries are placed in columns side by side, it makes it easy for comparative study. Sometimes

the information on uses is complimentary or supportive to two or more countries but sometimes the traditional healers in their respective localities use the plant species in a totally different way to treat the different ailments or diseases. A total count of all the diseases or ailments in the three countries shows that the traditional healers could cure 281 diseases or ailments in India, 163 diseases or ailments in Thailand and 298 diseases or ailments in Viet Nam.

The plants: *Abutilon indicum*, *Allium sativum*, *Centella asiatica*, *Orthosiphon aristatus*, *Piper nigrum* and *Quisqualis indica* were used to cure similar ailments in India, Thailand and Viet Nam by the traditional healers. The reason for this can only be conjectured by saying that it may have originated independently in the three countries or at some point in the past there was some sort of acculturation or the adoption of a foreign practice or culture among the three countries as is seen in their religious and ritualistic practices even today.

Table 3: Frequency distribution of common diseases and plants used as medicine in the three countries studied

Names and definitions of 28 common diseases, ailments or conditions cured by the traditional healers	No. of plants used for cure			
	In India	In Thailand	In Viet Nam	Total
<i>Anthelmintic</i> - substance which exterminates intestinal worms	12	6	2	20
<i>Antipyretic</i> - pertaining to a substance which reduces fever	12	7	10	29
<i>Rheumatism</i> - disease characterized by inflammation of the joints	10	1	8	19
<i>Stomach ache</i> - pain in the stomach.	9	6	8	23
<i>Diarrhea</i> - abnormally frequent and fluid bowel movements	8	5	11	24
<i>Piles or Hemorrhoids</i> - swollen blood vessels near the anus	7	1	2	10
<i>Skin Diseases</i> - a dermatological condition	6	7	2	15
<i>Asthma</i> - shortness of breath; respiratory disorder	6	0	4	10
<i>Earache</i> - pain in the ear	6	0	0	6
<i>Flatulence</i> - accumulation of gas in the stomach	6	13	4	23
<i>Tonic</i> - a restorative substance	6	7	1	14
<i>Dysentery</i> - severe form of diarrhea that shows blood in the feces along with intestinal cramping	5	5	7	17
<i>Ringworm</i> - any of several contagious fungal skin diseases characterized by itchy ring-shaped patches on the skin	5	2	1	8
<i>Boils or furuncles</i> - is a skin disease caused by the inflammation of hair follicles	4	0	4	8
<i>Cough</i> - loud expulsion of air from the lungs	4	3	10	17
<i>Headache</i> - pain in the head	4	2	5	11
<i>Tooth ache</i> - pain caused in the teeth by infection or swollen gum.	4	2	0	6
<i>Inflammation</i> - swelling or redness caused by infection or injury	4	0	8	12
<i>Food Poisoning</i> - illness caused by eating food contaminated with pathogenic or toxic substances	0	2	7	9
<i>Anemia</i> - lack of red blood cells	1	0	3	4
<i>Bronchitis</i> - inflammation of one or more bronchi	3	0	3	6
<i>Diabetes</i> - a syndrome characterized by disordered metabolism and inappropriately high blood sugar	4	2	1	7
<i>Diuretic</i> - causing an increase in urination	4	7	4	15
<i>Expectorant</i> - promoting the discharge of phlegm	2	4	0	6
<i>Antibacterial</i> - substance that is active against bacteria.	0	0	9	9
<i>Dysuria</i> - painful urination	2	0	4	6
<i>Hypertension</i> - abnormally high blood pressure	0	0	3	3
<i>Jaundice</i> - disorder caused by an excess of bile in the blood	3	0	4	7
Grand Total	137	82	125	344

Table 5 presents the list of medicinal plants along with their family names and active principles. This information has been carefully put together from various sources (Chang and But 1986; WHO 1990; Farnsworth and Bunyapraphatsara 1992; Pushpangadan et al. 1995; De Padua et al. 1999; Cragg and Newman 2001; Parrotta 2001; Kurian 2004; Kurian 2007; Kurian 2010) and this valuable information can be used in the future for collaborative research.

CONCLUSION

The scope for research in the field of ethno-medicine is enormous and it calls for systematic study through careful observation, participation

and documentation. If we do not take advantage of this opportunity, we are bound to fail and be deprived of this irrecoverable wealth of information through the erosion process of urbanization, industrialization and modernization. The valuable information collected through research needs to be in print making it readily available to mankind who would otherwise be part of a serpentine queue in the hospitals and medical units around the world.

The most significant person in the life of a young child is the child's mother. In rural societies if the mothers have an understanding of the use of herbal medicines, it would help them save a large percentage of their meager family income by avoiding the expensive and often toxic mod-

Table 4: Plant names and its medicinal uses in India, Thailand and Vietnam

<i>Botanical names</i>	<i>Medicinal uses in India</i>	<i>Medicinal uses in Thailand</i>	<i>Medicinal uses in Vietnam</i>
<i>Abrus precatorius</i> L.	Chronic conjunctivitis	Conjunctivitis. Hoarseness of throat. Expectorant. Remedy for cold.	Coryza. Cough. Fever. Jaundice. Anti-inflammatory. Mastitis. Galactophoritis.
<i>Abutilon indicum</i> L.	Inflammation. Antipyretic. Diuretic. Removes mucous secretions from bronchial tubes.	Carminative. Promotes digestion. Tonic. Antipyretic Cough. Leukorrhea. Gall bladder problem. Diuretic. Antidiabetic. Urinary tract infection. Inflammation. Toothache. Gingivitis.	Coryza. Hyperthermia. Headache. Dysuria. Metrorrhoea. Furunculosis. Dysentery. Snake-bite. Jaundice.
<i>Acorus calamus</i> L.	Flatulence. Stomach ache. Promotes menstrual flow. Antipyretic. Calms nervous. Cause vomiting. Asthma, Diarrhoea. Chronic dysentery. Tonic. Removes mucous secretions from bronchial tubes. Anti fungal Scabies. Rheumatic pains. Epilepsy. Mosquito repellent.	Carminative. Stimulant. Stomachic. Tonic. Anticonsulant. Antispasmodic. Sedative.	Stomachic. Sedative. Diarrhoea. Gastralgia. Cough. Cronchial asthma. Neurasthenia. Fever. Convulsions. Rheumatism. Dermatosis. Haemorrhoids. Insecticide.
<i>Allium sativum</i> L.	Anthelmintic. Prevents spasms. Helps indigestion. Relieves flatulence. Stomach ache. Diuretic. Removes of mucous from bronchi. Antipyretic. Anti-inflammatory. Tuberculosis. Pneumonia. Asthma. Colds. Sore throat. Tonsillitis. Hypertension. Prevents cancer. Earache. Checks graying of hairs. Skin problems. Anticholesterolemia	Cough. Lung abscesses. Skin diseases. Menstrual disorders. Haematoma Contusion. Treat Ringworm Treat Tinea. Carminative. Diuretic. Emmenagogue.	Antibacterial. Anti-inflammatory. Anthelmintic. Dysentery. Amoebiasis. Cough. Bronchitis. Pertussis. Coryza. Influenza. Hypocholesterolaemic. Atherosclerosis. Treat boils. Abscesses. Phlegmons. Centipede bites.

Table 4: Contd...

<i>Botanical names</i>	<i>Medicinal uses in India</i>	<i>Medicinal uses in Thailand</i>	<i>Medicinal uses in Vietnam</i>
<i>Alpinia galangal</i> Willd.	Asthma. Bronchitis. Bad breathe. Throat irritation. Cold. Cough. Fever. Headache. Nausea. Pneumonia. Gum infections.	Purify blood. Indigestion. Contusions Infectious diarrhea. Chronic malaria. Treat Tinea. Cholera. Ringworm. Skin diseases. Impetigo. Urticaria. Toothache. Antispasmodic. Anthelmintic. Carminative. Antiflatulence.	Antibacterial. Digestive. Dyspepsia. Flatulence. Vomiting. Gastralgia. Colic. Diarrhoea. Diarrhoea. Malaria. Toothache.
<i>Alstonia scholaris</i> L.	Anthelmintic. Improves lactation in nursing mothers. Antipyretic. Diarrhea Dysentery. Asthma. Cardiac problems. Eliminates boils, Ulcers. Muscular pains. Rheumatism. Earaches. Stomachache. Irregular stools. Loss of appetite in infants. General debility or weakness, Dysentery. Indigestion. Antipyretic. Sore throat. Liver and spleen enlargement. Constipation. Jaundice; Anthelmintic Laxative.	Antipyretic. Skin diseases. Antidysenteric. Anthelmintic. Tonic. Antidiabetic. Liver problems. Intestinal problems.	Tonic. Antiseptic medicine. Anaemia. Menstrual disorders. Malarial fever. Colic Diarrhoea. Dysentery. Acute arthritis. Dental caries.
<i>Andrographis paniculata</i> Nees.	Stomachache. Irregular stools. Loss of appetite in infants. General debility or weakness, Dysentery. Indigestion. Antipyretic. Sore throat. Liver and spleen enlargement. Constipation. Jaundice; Anthelmintic Laxative.	Diabetes. Fever. Itching skin.	Antibacterial. Anti-inflammatory. Immunosuppressive properties. Dysentery. Diarrhoea. Enteritis. Fever. Coryza. Cough. Sore throat. Tonsillitis. Bronchitis. Osteodynia. Arthralgia. Menstrual Haematometra. Scrofula. Hypertension Snake-bite. Antiseptic. Laxative. Constipation. Edema. Hepatitis. Icterus. Dermatomycosis. Ringworm Tinea. Scabies. Impetigo.
<i>Cassia alata</i> L.	Ringworm. Cough. Asthma. Vermicide. Eczema. Calculus or gravel	Laxative. Anthelmintic. Skin diseases.	

Table 4: Contd...

<i>Botanical names</i>	<i>Medicinal uses in India</i>	<i>Medicinal uses in Thailand</i>	<i>Medicinal uses in Vietnam</i>
<i>Cassia tora</i> L.	Mild laxative. Prevents malaria. Antipyretic. Anthelmintic. Helps digestion. Intestinal disorders. Itching of skin Ringworm. Skin diseases.	Laxative. Expectorant. Skin diseases.	Laxative Laxative Insomnia. Headache. Constipation. Oliguria. Cough. Ophthalmia. Dacryoliths. Amblyopia. Ocular congestion . Hypertension. Oliguria. Haematuria. Diabetes mellitus. Menstrual disorders. Hypertension. Leukaemia. Cerebrovascular dilation.
<i>Catharanthus roseus</i> L.	Anticarcinogenic. Diabetes. Diarrhoea. Vermifuge. Toothache.	Antidiabetic. Emetic. Diaphoretic. Purgative. Hemostatic. Emmenagogue. Antimalarial. Laryngitis. Chest complaints. Wound healing.	Antibacterial. Anti-inflammatory. Antifebrile. Diuretic. Galactagogic activity. Fever. Measles Measles Haematemesis. Epistaxis. Diarrhoea. Dysentery. Constipation. Leucorrhoea. Jaundice. Dysuria. Furunculosis. Dysmenorrhoea. Varices.
<i>Centella asiatica</i> L.	Rejuvenation. Diuretic. Anti-inflammatory. Purifies blood. Calms nerves. Leprosy. Skin diseases. Chronic ulcers. Rheumatism. Piles or Hemmoroids. Antipyretic. Dysentery. Tonic for improving memory. Hair growth	Leprosy. Tonic. Diuretic.	Antiseptic. Antiseptic. Antifebrile. Stomachic. Coryza. Influenza. Influenza. Pyrexia. Dyspepsia. Vomiting. Carminative. Eczema. Insecticide for mosquitoes. Deodorant.
<i>Cymbopogon citrates</i> DC	Tone and vitality to body. Check flatulence. Stomach ache. Lowers the body heat. Prevents or cures spasms. Checks vomiting. Diarrhoea. Headache. Dysmenorrhoea. Chronic rheumatism. Sprains.. Lumbag. Insomnia.	Carminative. Tonic. Diuretic. Stimulant. Diaphoretic. Deodorant.	Menstrual disorders. Dysmenorrhoea. Gastralgia, Dyspepsia. Diarrhoea. Vomiting.
<i>Cyperus rotundus</i> L.	Dysmenorrhoea. Stomach ache. Dyspepsia. Diarrhoea. Vomiting.	Diuretic. Diuretic. Antipyretic. Stomachic. Cardiotonic. Sudorific. Antidysentery. Carminative. Antiflatulence. Digestive agent. Appetite stimulant.	

Table 4: Contd...

<i>Botanical names</i>	<i>Medicinal uses in India</i>	<i>Medicinal uses in Thailand</i>	<i>Medicinal uses in Vietnam</i>
<i>Datura innoxia</i> L.	Piles or Hemorrhoids. Rheumatism. Inflammations. Eye diseases. Earache.	Antiasthmatic. Antimicrobial.	Antispasmodic. Sedative. Anodyne.. Cough. Asthma. Rheumatism. Chilblains. Gastric ulcers. Haemorrhoids. Sea sickness. Antibacterial. Demulcent. Diuretic Boils. Impetigo. Prurigo. Metritis. Leucorrhoea. Mastitis. Nephritis. Cytitis. Dysuria. Infections. Amoebicidal. Scabies.
<i>Hibiscus mutabilis</i> L.	Cough. Menorrhagia. Dysuria. Burns and scalds. Chest and lung complaints. Edema.	Skin diseases. Itching. Antipyretic. Skin allergies.	
<i>Holarrhena antidysenterica</i> Wall.	Anthelmintic. Amoebic dysentery. Diarrhea. Fever. Piles. Leprosy. Skin diseases. Diseases of the spleen. Biliousness. Headache. Strengthen gums. Inflammation. Leucoderma. Body pain. Erysipelas. Fatigue Hallucinations. Flatulence. Stomach ache. Asthma. Improves lactation in nursing mothers. Chronic bronchitis. Lumbago. Boils. Ulcers. Wounds. Regulate menstruation. Prevents or cures spasms. Flatulence . Stomach ache. Tonic. Ear ache. Antipyretic Jaundice. Inflammation of the prostate. Gallstones.	Antidysenteric. Antidiarrheal. Antipyretic. Anthelmintic. Stomachic. Tonic.	
<i>Mentha spicata</i> L.		Carminative. Antiflatulent. Headache. Treatment for fainting. Sprains.	Antibacterial. Antifebrile. Coryza. Adiaphoretic fever. Headache. Rhinitis. Cough. Sore throat. Arthralgia. Neuralgia. Colic.

Table 4: Contd...

<i>Botanical names</i>	<i>Medicinal uses in India</i>	<i>Medicinal uses in Thailand</i>	<i>Medicinal uses in Vietnam</i>
<i>Morus nigra</i> L.	Checks vomiting. Dysmenorrhoea. Disease of the uterus. Infections of the throat. Toothache. Anthelmintic. Improves lactation in nursing mothers. Reduces itching of the skin. Nutritive. Lowers body heat. Laxative. Anthelmintic. Checks anemia.	Cough. Sedative. Eye infection.	Vomiting. Dyspepsia. Diarrhoea. Prurigo. Coryza. Cough. Insomnia. Asthma. Oliguria. Rheumatism. Osteodynia. Anaemia. Dysopia. Sore throat. Ulcerous stomatitis. Neurasthenia. Spermatorrhoea. Metrorrhoea. Insomnia. Haemorrhage. Haematemesis. Bloody stools. Haematuria. Uterine Haemorrhage.
<i>Nelumbium speciosum</i> Willd.	Menorrhagia. Piles or Hemorrhoids. Dysentery. Indigestion. Ringworm. Headache. Antipyretic. Checks leprosy. Dysuria. Checks vomiting. Dieuritic. Expectorant for bad coughs. Catarrh. Bronchitis. Ringworm. Gastric disorders Earache. Athlete's foot. Urogenital disorders. Stings of bees, wasps. Anthelmintic. Constipation. Piles. Sinusitis. Kidney stones. Bladder stones Gout Rheumatism Diabetes	Tonic. Expectorant.	Antibacterial. Antifebrile. Demulcent. Coryza. Fever. Headache. Colic. Diarrhoea. Chest pains. Vomiting. Chilblains. Edema. Epistaxis. Halitosis. Diuretic. Urinary lithiasis. Edema. Eruptive fever. Influenza. Rheumatism. Hepatitis. Jaundice. Biliary lithiasis. Antibacterial. Purulent paradontosis. Wounds Burns. Impetigo. Furunculosis. Eczema. Lymphangitis. Cough. Asthma. Arrest lactation. Rheumatism.
<i>Ocimum sanctum</i> L.		Carminative. Stomachic.	
<i>Orthosiphon aristatus</i> Benth.		Diuretic. Nephritis Hydronephrosis. Arteriosclerosis. Gout. Rheumatism. Stomach ache Food poisoning Sprains and bruises Anti-inflammatory. Antimicrobial. Carminative.	
<i>Piper betle</i> L.	Stomachache. Cough. Bronchitis. Wounds. Arthritis. Orchitis. Filariasis. Boils. Burns.		

Table 4: Contd...

<i>Botanical names</i>	<i>Medicinal uses in India</i>	<i>Medicinal uses in Thailand</i>	<i>Medicinal uses in Vietnam</i>
<i>Piper nigrum</i> L.	Indigestion. Tones the body. Anti-inflammatory. Flatulence. Toothaches. Skin disorders. Muscle pain. Diarrhoea. Cholera. Giddiness. Constipation. Control obesity. Toothache. Earache. Enuresis. Urticaria. Pruritis. Bee Sting. Bleeding piles or Hemorrhoids.	Carminative. Stomachic. Diarrhea. Dysentery. Cholera. Urinary calculus. Headache.	Stomachic. Anodyne. Antibacterial. Dyspepsia. Vomiting. Diarrhoea. Colic. Toothache. Insecticide.
<i>Plantago major</i> L.		Diuretic. Sore throat. Dermatitis. Insect bite. Plant allergies.	Diuretic. Edema. Dysuria. Haematuria. Urinary lithiasis. Persistent cough. Bronchitis. Ophthalmia. Burns. Furunculosis. Diarrhoea. Dysentery. Taeniasis. Dysentery. Diarrhea.
<i>Punica granatum</i> L .	Anthelmintic Diarrhea Conjunctivitis Urinary tract inflammation	Antidysenteric. Diarrhea. Taeniafuge. Sore throat. Sore throat. Nosebleed. Hemorrhoid.	
<i>Quisqualis indica</i> L.	Anthelmintic. Parasitic skin problems. Checks ringworms. Malnutrition. Ulcers	Anthelmintic. Hydragogue. Vomiting.	Anthelmintic. Rheumatism. Toothache.
<i>Ricinus communis</i> L.	Skin diseases Boils Rheumatism Warts	Cancer Food poisoning Skin diseases Warts	Laxative. Purgative. Facial paresis. Induce labour. Dystocia. Placenta retention.
<i>Strychnos nux-vomica</i> L.	Antipyretic Anaemia Jaundice Lumbago Rheumatism	Tonic. Purifies the blood. Stomachic. Stimulant. Aphrodisiac.	Rheumatism. Pain. Neuralgia. Paralysis. Myasthenia. Enteric hypotonia. Enuresis. Anaemia.
<i>Thevetia peruviana</i> Pers.	Insecticide. Antipyretic. Mild laxative. Cardiotonic. Cathartic. Fibrifuge.	Antipyretic.	Cardiotonic. Insecticide.
<i>Vitex negundo</i> L.	Tonic. Febrifuge. Expectorant. Vermifuge. Headache. Rheumatism. Catarrh. Toothache. Eye diseases.	Expectorant. Anthelmintic.	Coryza. Anthelmintic. Antipyretic. Headache. Photopsia Vertigo. Ophthalmalgia. Glaucoma. Rheumatism. Neuralgia.

Table 5: Medicinal plants and family names with active principles

S. No.	Botanical name	Family name	Active principles
1.	<i>Abrus precatorius</i> L.	Fabaceae/Leguminosae	Abrin, abridin, lectins, abrectorin, hypaphorine, precatorine, hemiphloin, abrusgenic acid.
2.		Abutilon indicum L	Malvaceae Raffinose, linoleic acid, oleic acid, palmitic acid and stearic acid.
3.		Acorus calamus L.	Acoraceae/Araceae Acorin, asarone, acolamone, calamen, calamenol, calameon, oxalic acid, isocalemendiol, methyl eugenol.
4.		Allium sativum L.	Alliaceae/Liliaceae Alliin, allyl propyl disulphide, diallyl disulphide, allisatin I and II.
5.	<i>Alpinia galangal</i> Willd.	Zingiberaceae	Essential oil, cineole, mecinnamate, sesquiterps, α -pinene, β -pinene, limonene, α -terpineol, kaempferide, galangin, alpinin.
6.	<i>Alstonia scholaris</i> L.	Apocynaceae	Ditamine, echienine, echitamine, akuammicine, tubotaiwine, picrinine, echitamidine, akuammidine, nareline, oxnareline, picralinal.
7.	<i>Andrographis paniculata</i> Nees.	Acanthaceae	Andrographin, panicolin, β -sitosterol, glucoside, andrographolide, panicolide, polyphenols, caffeic and chlorogenic acids.
8.	<i>Cassia alata</i> L.	Fabaceae/Leguminosae	Xanthone cassiollin, chrysophanol, emodin, rhein, aloemodin, kaempferol, anthraquinone and chrysophanic acid.
9.	<i>Cassia tora</i> L.	Caesalpinaceae	Chrysophanol, chrysophanol triglucoside, aloemodin glucoside, physcion diglucoside, chrysarobin, emodin glucoside and oil.
10.	<i>Catharanthus roseus</i> L.	Apocynaceae	Vincristine, vinblastine, leurosine, leurosine, ajmalicine, serpentine, catharanthine, reserpine.
11.	<i>Centella asiatica</i> L.	Apiaceae/Umbelliferae	Asiaticoside, madecassoside, brahmoside, centelloside, oxyasiaticoside, thankuniside, isothankuniside, asiatic acid, sitosterol, tannin, vellarine, pectic acid, resin, ascorbic acid.
12.	<i>Cymbopogon citrates</i> DC	Poaceae/Gramineae	Citrals, citronellal, citronellol, geraniol, linalool, dipentene, furfural, methylheptenone, methylheptenol, eugenol, citronellic acid, isoorientin, phenolic substance, cymbopol, luteolin, menthol, myrcene, cymbopogonol, cymbopogonol, cymbopogone, camphor.
13.	<i>Cyperus rotundus</i> L.	Cyperaceae	Arachidic acid, carnaubic acid, caryophyllene, cineole, cyperene, cyperenone, cyperol, cyperolone, α -copaene, p-coumaric acid, cyperene, cyperenone, cyperol, cyperolone, α -cyperone, cyperotundone, cytochrome C oxidase, β -elemene, ferredoxin, ferulic acid, linoleic acid, myristic acid, oleanolic acid, α -rotundol, β -rotundol, β -sitosterol.
14.	<i>Datura innoxia</i> Mill.	Solanaceae	Hyoscine, atropine, hyoscyamine, meteloidine, scopolamine, littorine, tigloidine, cuscohygrine, tropine, pseudotropine, fastunine, datumetine, daturanalone, daturadiol, nicotianamine.
15.	<i>Hibiscus mutabilis</i> L.	Malvaceae	Flavonoids and anthocyanosides in flowers.
16.	<i>Holarrhena antidysenterica</i> Wall.	Apocynaceae	Conessine, conessimine, conimine, konkurchine, conessidine, trimethylcondurchine, kurchessine, kurcholessine, lupadienol, stiostadienol.
17.	<i>Mentha spicata</i> L.	Lamiaceae/Labiatae	Essential oil.
18.	<i>Morus nigra</i> L.	Moraceae	Essential oil.
19.	<i>Nelumbium speciosum</i> Willd.	Nymphaeaceae	Nuciferine, nonacosanol, sitosterol, proferine, anonaine, methylcorypalline, neferine, coclaurine, liensinine, isoliensinine, armepavine, tannins, demethylcoclaurine, flavonoids.
20.	<i>Ocimum sanctum</i> L.	Lamiaceae/Labiatae	Apigenin, luteolin, molludistin, orientin, gratissimin.
21.	<i>Orthosiphon aristatus</i> Bl.	Lamiaceae/Labiatae	Orthosiphonin, potassium, urea, ureids, hederagenin, β -sitosterol, ursolic acid and glycolic acid.

Table 5: Contd...

S. No.	Botanical name	Family name	Active principles
22.	<i>Piper betle</i> L.	Piperaceae	Estragole, caryophyllene, cardinene, catechols, chavicol, chavibetols, cineols, eugenols, terpinene, limonene, α and β -pinenes, safrols, pyrocatechols, β -sitosterol, stigmasterol and essential oil.
23.	<i>Piper nigrum</i> L.	Piperaceae	Dienamides, trienamides, trichostachine, feruperine, guineensine, piperide, piperamine, dihydropiperide, coumaperrine, tyramine, piperettine, piperidines, piperines, rhamnetin glycosides, essential oils.
24.	<i>Plantago major</i> L.	Plantaginaceae	Aucubin, oleanolic acid, mucilage, tannin, saonins, essential oil, vitamins A, C and K, citric acid, planteose and potassium salts.
25.	<i>Punica granatum</i> L.	Punicaceae	Pelletierine, methylpelletierine, isopelletierine, friedelin, betulic acid, ursolic acid, betulinic acid, callistephin, chrysanthemin, granatin B, flavonoids, anthocyanins, pectin, tannins.
26.	<i>Quisqualis indica</i> L.	Combretaceae	Quisqualic acid, pelargonidin-3-glucoside, alanine, asparagines, aspartic acid, glutamic acid, glycine, histidine, leucine, lysine, proline, serine, threonine, valine, mannitol.
27.	<i>Ricinus communis</i> L.	Euphorbiaceae	Ricinine, toxalbumin ricin, oil contains palmitic, stearic, arachidic hexadecenoic, oleic, linoleic, linolenic, ricinoleic, dihydroxystearic acids. Luoel.
28.	<i>Strychnos nux-vomica</i> L.	Loganiaceae	Strychnine, brucine, vomicine, novacin, α - and β -colubrines, protostrychnine, isostrychnine, p-dydroxybenzoic, sinapic and syringic acids, kaempferol, quercetin, protostrychnine, normacusine B.
29.	<i>Thevetia peruviana</i> Pers.	Apocynaceae	Bornesitol, dambonitol, peruvoside, nereifolin, theviridoside, theveside, thevefolin, thevetin, lupeol, betulin, hesperitin, epiperuvial.
30.	<i>Vitex negundo</i> L.	Verbenaceae	Nishindine, hydrocotylene, essential oil.

ern drugs that bring about side effects. They could easily take care of the common ailments using the herbs that are readily available in their neighborhood.

There is also an urgent need to collaborate with the native doctors to unravel the medicinal secrets of herbs, to record, document the findings, and validate the same with the help of experts using modern techniques; and to make this valuable information known to mankind before it is lost. It is important to keep in mind the 'principal of reciprocity' while taking on research of this kind. If any of the medicinal plants are put out into the market or becomes commercialized, I would say that 50% or more of the benefits should go back to the traditional healers, their families and their community from where the information was initially gained.

Thanks to the rich flora and fauna, diverse climatic zones and the wealth of living ethnomedical traditions, India, Thailand and Viet Nam offer unrivalled opportunities for research in the

field of ethno-medicine. While the harvest is plentiful and laborers are few, one is heartened to note that through the efforts of a few dedicated and committed scientists who have introduced on-line journals for rapid dissemination of scientific knowledge, valuable information can be shared with colleagues around the world and we can together continue our search for excellence and take a few strides forward in assisting those members of the human family who need simple medical help and guidance.

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