

# **Ethnomedicinal Plant Resources of Mizoram, India: Implication of Traditional Knowledge in Health Care System**

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## **Abstract**

Socially, folk medicines, mainly based on plants, enjoy a respectable position today, especially in the developing countries, where modern health service is limited. Safe, effective and inexpensive indigenous remedies are gaining popularity among the people of both urban and rural society of India. A floristic survey of ethnomedicinal plants occurring in the tribal area of Mizoram was conducted over the period of last five years to assess the potentiality of plant resources for modern treatments. The information provided in this paper on medicinal uses of plants is based on the exhaustive interviews with local physicians practising indigenous system of medicine, village headmen, priests and various tribal folks/groups of Mizoram. In this paper, 159 ethnomedicinal plant species belonging to 134 genera and 56 families recorded from tropical forests, home gardens, roadsides and University Campus of Mizoram have been described. A categorical list of plant species along with their local name, scientific name, distribution status, habit, plant part/s used and the mode of administration reported for effective control of different diseases linked with humans.

**Keywords:** Etnomedicines; Tribals; Asteraceae; Ethnobotany; Hot spot.

## **Introduction**

India has rich diversity of medicinal plants distributed in different geographical and environmental conditions. Tribal people in different parts of India, use their traditional ecological knowledge (TEK), received from their ancestors and contemporary society, in primary health care. Moreover, TEK of tribals is intimately linked with geography as well as ecological and cultural factors (Gesler 1992; Wiley 2002).

Ethnobotany, as an application of TEK, must have been the first knowledge acquired by man to satisfy his hunger, healing his wounds and curing various ailments (Kshirsagar and Singh 2001). Ethnobotany is defined as “the investigation and evaluation of the knowledge of all phases of life amongst the primitive societies and plant environment with respect to life, customs, beliefs and history of the tribal people” (Kshirsagar and Singh 2001). Ethnomedicine, as defined by Foster and Anderson (1978), is the totality of health, knowledge, values, beliefs, skills and practices of members of a society including all the clinical and nonclinical activities that relate to their health needs. Therefore, traditional/folk medicines have inextricable link with human society.

Plants have been used since ancient times for the treatment of various ailments. The traditional systems of medicine together with folklore systems continue to serve a large portion of the population, particularly in rural areas, in spite of the advent of the modern medicines. Out of about 15,000 species of higher plants in India, medicinal uses have been attributed to 1500 species (Handa 1998).

The traditional medical practices based on plants are an important part of the primary healthcare system in the developing world (Sheldon et al. 1997). According to the World Health Organization (WHO) as many as 80% of world's population depends today on traditional medicine for their primary health care needs (Azaizeh et al. 2003). Safe, effective and inexpensive indigenous remedies are gaining popularity among the people of both the urban and rural areas, especially in India and China (Katewa et al. 2004).

Many tribal communities in India still practice use of their TEK to cure a variety of diseases and ailments (Jain and Dam 1979; Katewa et al. 2001; Kshirsagar and Singh 2001; Jagtap et al. 2006; Kala and Sajwan 2007; Sajem et al. 2008; Katewa 2009). There are a few surveys that reveal the practice of herbal medicine by the Korkus (Bhogaonkar and Devarkar 2002a, b; Padhye et al. 1991, 1992) and other tribes of Melghat area (Chaudhari and Hutke 2002). Review of literature revealed that few reports on the ethnopharmacognostic studies and the use of some plants for antisterility and urinogenital disorders are available (Bhogaonkar and Devarkar 2002a, b). Further, this plant-based TEK has become a recognized tool in search for new sources of drugs and nutraceuticals (Sharma and Mujumdar 2003). Henceforth, age-old knowledge of the plants is the basis for ethnobotanical research in India (Jagtap et al. 2006).

The tribes of the Himalayan region also have rich ethnomedicinal traditions for which a few literatures are available (Biswas 1956; Bennet 1983; Yonzon et al. 1984; Srivastava et al. 1987; Venu et al. 1990; Pandey 1991; Rai and Sharma 1994; Rai et al. 1998; Rai and Bhujel 1999, 2002; Das and Mandal 2003; Sajem et al. 2008). Plants and their parts are not only used as food and medicine but also used in various tribal rituals that are a part of their social and religious life (Etkin and Rose 1991; Rai 2009).

The aim of the present study was to evaluate some medicinal uses of the plants utilized by the different tribes of Mizoram (an Indo Burma hot spot region) and encourage preservation of their culture, traditional knowledge, conservation and sustainable utilization of the plant wealth occurring in the study area. In the present paper, we report some ethnomedicinal uses in the treatment of different ailments by the tribal peoples of Mizoram, India.

### **Study area**

North East India (NE India) forms a significant portion of both the Himalaya and Indo-Burma biodiversity hotspots. Study area, Mizoram, the 23<sup>rd</sup> state of the Indian union, covers an area of 21,087 sq.km and is sandwiched between Myanmar (Burma) and Bangladesh (Figure 1). Mizoram is an important state of North-eastern (NE) India and also is a part of the 25 mega-biodiversity hotspots of the world. The forests in Mizoram are classified as Tropical Wet Evergreen Forests, Tropical Semi-Evergreen Forests and Sub-Tropical Hill Forests. Therefore, there are varying forest types Mizoram which are of immense values to mankind. However, these forests are exposed to various anthropogenic disturbances e.g. shifting cultivation, timber logging, extraction of fuel wood by poor/rural tribals, industrialization and in fact urbanization in some parts of state like Aizawl (Rai et al. 2009). In NE India, nearly 80 percent of the population depend on agriculture, where the economy is predominantly agrarian and rural, where tribal with subsistence living constitute about 27 percent of the population and where nearly 87 percent of the population live a deprived life in nearly 43,000 villages. In the NE Himalayas, subsistence largely depends upon resources derived from natural forests due to the free and easy access to these and simplicity in their use.

The vegetation of Mizoram, according to proposed classification, is tropical evergreen and semi-evergreen forest in the lower altitude hills; sub-tropical to montane sub-tropical in the high hills. A major portion of Mizoram's

forests are therefore tropical evergreen and semi-evergreen (Rai 2009).

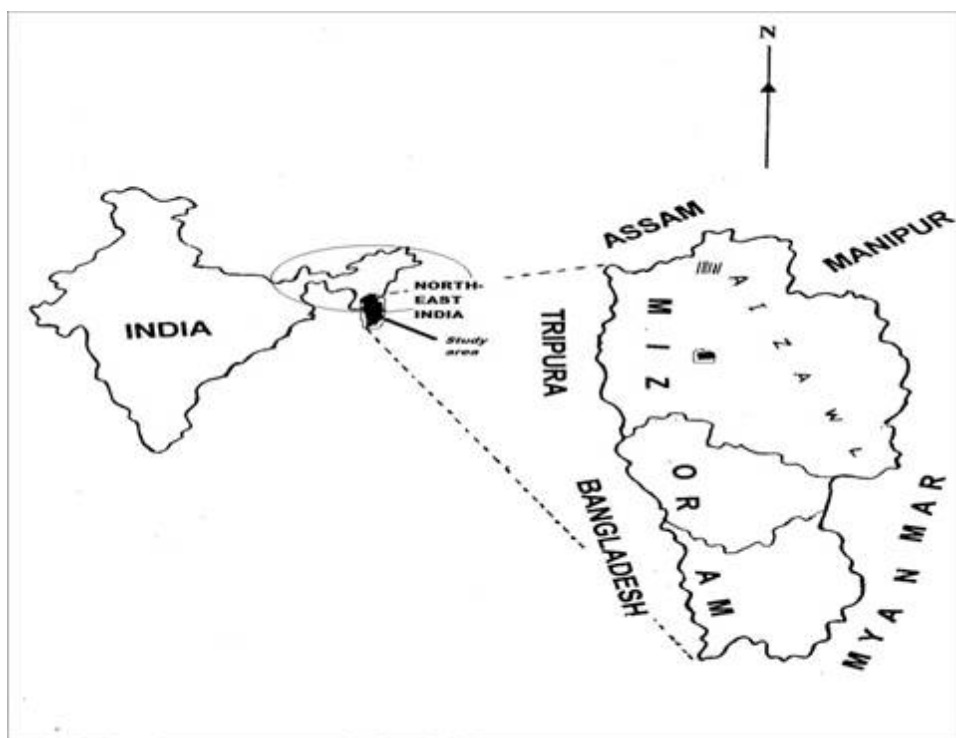


Fig. 1 represents the population of Mizoram and its high intensity in capital, Aizawl.

It is worth to mention that in Mizoram, the number of doctors and other medical staff is very low, in comparison to the total population (ratio doctors to total population was 1:3415) (Sharma *et al.* 2001). Moreover, the topography of Mizoram is responsible for the under developed communication system in the state. Thus, the people of the rural areas cannot avail of modern methods of treatment and they search for remedies from nature (Sharma *et al.* 2001).

Table 1. Population distribution in Mizoram and Aizawl.

Mizoram	Total	Male	Female	Aizawl	Total	Male	Female
Total	689 756	358 978	330 778	Total	478 465	248 343	230 122
Rural	371 810	194 414	177 396	Rural	218 744	114 630	104 114
Urban	317 946	164 564	153 382	Urban	259 721	133 713	126 008

Source: Sharma et al. (2001)

## Methodology

The indigenous peoples belonging to different tribes were interviewed pertaining to mode of use and identification in local name as per Lalramnghinghlova (1998). Some of the 'Red Listed species' documented in the study area are marked (IUCN, 2003). Although it was tedious one because the indigenous peoples are hesitant to transfer their indigenous knowledge acquired from their ancestors since the time immemorial. During last 5 years of study (2004-2008), we recorded these ethnomedicinal plants from different forest types of Mizoram, protected areas of Mizoram, home gardens, herbal gardens as well as Vanaspati Van. Assistance from other Institutes has been taken for rapid identification through the herbariums which were finally submitted to Department of Environmental Science, Mizoram University, India.

## Results

A total of 159 ethnomedicinal plants belonging to 134 genera and 56 families which were recorded during the study have been listed (Table 2). Asteraceae family comprised maximum number of ethnomedicinal plants (16) followed by Euphorbiaceae (9), Zingiberaceae, Clusiaceae, and Rubiaceae (7 each). Scientific name, local name, Family, their habit, survival status in Mizoram, plant parts used are mentioned precisely in Table 2. Further, mode of utilization and their specific role in curing different diseases linked with human society is also discussed.

Table 2. Ethnomedicinal plants recorded from Mizoram (2004-2008).

S.No.	Scientific name	Local/Mizo name	Family	Habit	Status	Part Used	Mode of Utilization/Uses
1.	<i>Abelmoschus moschatus</i> Medicus.	Uichhuhlo	Malvaceae	Herb	F	Root, seed & leaf	Boiled roots & leaves is administered for syphilis; crushed root is applied externally on wounds/ulcers to suck the pus out; seeds are grinded to powder & the powder is taken with water for throat-pain twice daily
2.	<i>Achyranthes bidentata</i> L.	Vangvat-tur	Amaranthaceae	Herb	A	Leaf	The leaves are crushed and the juice is applied for the remedy of poisoned leach bite
3.	<i>Achyranthes aspera</i> L.	Buchhawl	Amaranthaceae	Herb	A	Whole plant	Taken for dysentery, colic diseases, in boils & cirrhosis
4.	<i>Adhatoda zeylanica</i>	Kawldai	Acanthaceae	Herb	F	Leaf	Leaf is antispasmodic, used in chronic bronchitis, anti-diarrhoea, expectorant, antirheumatism, insecticidal; root antiseptic, antiperiodic, antihelminthic, antigonorrhic; flowers and fruits are also antispasmodic
5.	<i>Aeginetia indica</i> L.	Sanghar-vaibel	Orobanchaceae	Ephemeral	F	Root/ Rhizome	Juice of the rhizome is applied to mumps & inflammatory glands; Root in combination with other plants prescribed as the pills for fertility
6.	<i>Aegle marmelos</i> L.	Belthei	Rutaceae	Tree	EN	Pulp of fruit	Decoction of fruit is applied for the remedy of dysentery, stomachache & digestive problems
7.	<i>Aeschynanthus sikkimensis</i> Stapf. EFPN*	Bawltehlantai	Gesneriaceae	An epiphytic undershrub	F	Rootstock leaves & flowers	Fever & pain; Juice of crushed leaves is applied for inflammatory glands; infusion of flowers is taken against tonsillitis

8.	<i>Ageratum conyzoides</i> L.	Vailenhlo	Asteraceae	Herb	A	Root	The root is crushed with <i>Callicarpa arborea</i> (Hnah kiah) bark and rhizome of <i>curcuma</i> (Aieng) & the juice is drunk for the remedy of stomach cancer; stem and leaf as anti-diarrhoeal & also aid in clotting of blood
9.	<i>Albizia procera</i> (Roxb.) Bennth.	Kangtekpa	Mimosaceae	Small tree	F	Bark, Leaf & root	The poultice of leaves is applied to ulcers; The crushed bark is used for fish-poisoning ; important <i>Agroforestry plant</i> ; the brown & durable heartwood is used as agricultural implements & as charcoal
10.	<i>Albizia odoratissima</i> (L.f.)	Kangteknu	Mimosaceae	Tree	F	Leaf	The leaf is boiled in ghee & is used in remedy for cough
11.	<i>Bauhinia variegata</i> Linn.	Vaube	Caesalpinaceae	Tree	C	Bark & flower	Bark is carminative, tonic; astringent, antidiarrhoea, as blood purifier, as tonic, used in goitre; flower as laxative
12.	<i>Bergenia ciliata</i> (Haw.) Sternb.	Pan-damdawi	Saxifragaceae	Herb	R	Leafs & roots	Leaf used in ear-ache; leaf & root as tonic, antiscorbent, in antidiarrhoea, fubrifuge, in piles & in urinary problems
13.	<i>Begonia inflata</i> Cl.*	Sekhupthur-hmul	Begoniaceae	Herb	R	Whole plant	The whole plant is being used in the form of infusion for patients troubled with kidney and urinary troubles
14.	<i>Bidens pilosa</i> (Lour.) Merr. & Sheriff	Vawkpuihal	Asteraceae	Herb	C: as weeds	Shoot, leaf & floral parts	Young shoot is antirheumatic; leaf in eye and ear complains; flower-antidiarrhoeal
15.	<i>Bischofia javanica</i> Bl.	Khuangthli	Bischofiaceae	Tree	F	Leaf, shoot & bark	Young leaves and buds are used in tonsillitis and throat pain; infusion of young shoot & leaves is taken orally for diphtheria & pharyngitis; decoction of the bark is taken internally for cholera
16.	<i>Blumea lanceolaria</i> (Roxb.)*	Buarze	Asteraceae	Shrub	R	Leaves	Anti-cancer agent, pressed juice of leaves is applied on wounds & chronic ulcers, infusion of leaves is taken against dysentery
17.	<i>Blumea laciniata</i> (Roxb.)*	Khuanglawr	Asteraceae	Herb	F	Root & leaves	Cardiac tonic; paste from root is used against snake bite; simultaneously, leaves are crushed & the juice is applied externally on the bitten part

18.	<i>Callicarpa arborea</i> Roxb.	Hnahkiah	Verbenaceae	Tree	A	Bark	The bark is crushed & the juice is drunk for the remedy of stomach pain, dysentery and vomiting, juice of the inner coat of bark is effectively used as haemostatics on cuts
19.	<i>Callicarpa macrophylla</i> Roxb.	Hnahkiahte JHR.	Verbenaceae	Small Tree	F	Leafs	Leaves are turned into paste & applied in fracture of bone
20.	<i>Cammelia sinensis</i>	Thingpui	Theaceae	Small tree	F	Leaf	Tea leaf boiled is used as astringent, stimulant & diuretic
21.	<i>Canavalis ensiformis</i> Baker	Fangra	Papilionaceae	Climber	C	Seed	The sliced seed is applied to snake bite to suck out the poison
22.	<i>Carcinia paniculata</i>	Vawmva	Clusiaceae	Tree	F	Seed	The seed is used against roundworm
23.	<i>Carica papaya</i>	Thingfanghma	Caricaceae	Small tree		Fruit & seeds	Juice of unripe fruit in large doses as <b>ubolic</b> ; used to remove freckles and other blemishes from the skin, antihelminthic; ripe fruit useful in digestive problems; seed vermifuge
24.	<i>Caryota urens</i>	Tum	Arecaceae	Palm tree	F	Stem	The fleshy toddy is taken as food during famine
25.	<i>Cassia alata</i> Linn.	Tuihlo	Caesalpiniaceae	Shrub	F	Leaf	The leaves are bruised & applied to earthworm, ringworm infection as well as to other skin infections
26.	<i>Catharanthus roseus</i> Linn.	Kumtluang	Apocynaceae	Herb	F (introduced & naturalized)	Leaf, root & stem	The raw leaves are taken for the remedy of high blood pressure; Also leaves are anti-cancerous agent ; decoction of roots, stem & leaves is useful in diabetes, diarrhoea, dysentery, cholera
	<i>Caulokaempferia linearis</i> (Wall.) Larsen*	Lung-ai-thing Lalram	Zingiberaceae	Herb	C	Leaf	Chakmas apply crushed leaves on the head in vertigo
27.	<i>Cautleya gracilllis</i> (Smith) Dandy*	Pa-le	Zingiberaceae	Herb	R (cultivated)	Rhizome	Infusion of rhizome is taken for flatulence, colic & hepatomegaly , the rhizome is eaten raw to relieve colic & hotness in the stomach & also used cough
28.	<i>Centella asiatica</i> (L.) Urb.	Lambak/Hnahbial	Apiaceae	Herb	C	Leaf	Popularly used as memory stimulator. The leaves are boiled & the water is taken for the remedy of asthma and eye problems ; used also in hypertension
29	<i>Chassalia ophioxyloides</i> (Wall.) Craib.	Khummurmu	Rubiaceae	Roots	F	Roots	The root paste applied externally to chronic ulcers, tumours & sores
30.	<i>Chromolaena odorata</i> Linn.	Tlangsam	Asteraceae	Shrub	A	Leaf	Juice of crushed leaves applied externally as haemostatic agent

31.	<i>Chukrasia tabularis</i> A. Juss.	Zawngtei	Meliaceae	Tree	F	Root & seed-coat	Raw roots are taken for the remedy of stomach pain; infusion of seed-coat taken internally or a small portion is eaten raw for diarrhoea and dysentery
32.	<i>Chonemorpha fragrans</i> (Moon.) Alston	Phungthe ikelki	Apocynaceae	Climber	F	Roots	In Ethnognacology: Infusion of roots taken internally against retained placenta @ 100 ml twice daily
33.	<i>Cinnamomum obtusifolia</i> (Buch-Ham.) Sweet	Thakthingsuak	Lauraceae	Tree	F	Bark	Bark is used in dyspepsia and liver complaints
34.	<i>Cinnamomum-tamala</i> (Buch-Ham.) Sweet	Tejpatta	Lauraceae	Tree	F	Leaf & bark	Leaf is used as stimulant, carminative, antirheumatic, antidiarrhoeal; bark is used in treating gonorrhoea
35.	<i>Cinnamomum verum</i> (Buch-Ham.) Sweet	Thakthing	Lauraceae	Tree	F	Bark & leaf	Bark is carminative, antispasmodic, haemostatic, astringent, antiseptic; leaf antidiabetic
36.	<i>Dalbergia pinnata</i> (Lour.)*	Tengterehui	Fabaceae	Tree	VR	Root-bark	Stomach problems, hepatitis & toothache
37.	<i>Datura suaveolens</i> Hamb. & Bruph	Tawtawrawt par	Solanaceae	Shrub: Cultivated especially in home garden	F	Leaf	Leaves are dried & smoked as tobacco for chest complaints, asthma while roasted leaf is applied on breast lump/ stony hard breast
38.	<i>Dendrocnida sinuate</i>	Thakpui	Urticaceae	Shrub	A	Root	The root is boiled along with crabs & the water is taken for the remedy of jaundice
39.	<i>Dendrobium ariaeflorum</i> *	Naubanhlosen	Orchidaceae	Shrub/Or-chid	R	Stem	Used as narcotic
40;41;42	<i>Desmos chinensis</i> (Lour.)* <i>Desmos dumosus</i> * & <i>Desmos dumosus</i> (Roxb.) Safford. *(Used in isolation & in combination)	Zunin -damdawi	Annonaceae	Scandent scrub	C	Root & leaf	Combination of decoction of the roots is effectively used against painful urination. The medicine is taken ½ cup daily
43.	<i>Desmos longiflorus</i> (Roxb.) Safford*	Chi-ri-pi	Annonaceae	Small tree	R	Root & leaf	It constitutes one ingredient for the treatment of chronic ulcer; decoction of leaves used for asthma
44.	<i>Desmodium gyroides</i> DC.	Kerangkana	Fabaceae	Shrub	F	Root	Root paste in combination is used as an effective remedy against inflammatory glands.
45.	<i>Desmodium triflorum</i> (Linn.) DC.	Bawngkek-hlo Lalram	Fabaceae	Herb	F	Whole plant	The plants are boiled & the water is taken for kidney trouble & urinal problems; juice of fresh leaves is applied on wounds

46.	<i>Dillenia indica</i> L.	Kawrthindeng	Dilleniaceae	Tree	F	Fruit & bark	The fruit is boiled & the water is taken for the remedy of jaundice; infusion of bark taken @ 50 ml twice daily for diarrhoea & dysentery
47.	<i>Dillenia pentagyna</i> Roxb.	Kaihzawl	Dilleniaceae	Tree	F	Bark & wood	Used as anticancer & antiulcer agent; decoction of the bark is taken orally for diabetes, paste of bark is applied externally on rheumatic pains
48.	<i>Elaeagnus pyriformis</i> Hook. F.	Ramsarzuk	Elaeagnaceae	Shrub	R	Root	The paste from root is dipped in water & drunk in the problem of appendicitis
49.	<i>Elsholtzia blanda</i> Benth	Nauhri	Lamiaceae	Shrub	R	Aerial part	Infusion of aerial part of plant is used for children's disease called 'Nauhri', a combination of fever, cholera, skin diseases & inflammation; poultice of leaves is also used for inflammatory glands
50.	<i>Elsholtzia ciliata</i> (Thunb.) Hyland	Ram-lengser* Lalram	Lamiaceae	Herb	C	Whole plant	Juice of leaves is used as diuretic, cough & cold
51.	<i>Embelia subcoriacea</i> (Cl.) Mez.	Tling	Elaeagnaceae	Climber	F	Leaves	Decoction of leaves is used for bathing in the treatment of small pox & also used for bathing woman's injury after child birth
52.	<i>Embllica officinalis</i> L.	Sunhlu	Euphorbiaceae	Tree	A	Fruit	The raw fruit is taken for the remedy of stomach problem
53.	<i>Entada pursaetha</i> DC.	Kawi	Mimosaceae	Climber	F	Seed	The seeds are soaked in water & the water is dropped into the nostrils against leech
54.	<i>Ervatamia coronaria</i>	Pararsi	Apocynaceae	Shrub	F	Root, leaf & bark	The root provides comfort in toothache; root & bark used as antidote for scorpion sting; milky juice is used for disease of eyes
55.	<i>Eryngium foetidum</i> Linn.	Bahkhawr	Apiaceae	Herb	F	Root	Root used in stomachache
56.	<i>Erythrian stricta</i> Roxb.	Fartuahpui	Leguminoseae	Tree	F	Bark	The bark is use as astringent and antidote to snake bite; decoction of coat of inner bark is taken orally for stomach ulcer
57.	<i>Eucalyptus globules</i> Labill	Eucalyptus	Myrtaceae	Tree	C	Leaves	Infusion of leaves is taken against pneumonia; Charcoal is grinded to powder or made into paste & taken for stomach ulcer; Decoction of leaves is used for diabetes
58.	<i>Eupatorium adenophorum</i> Spreng.	Hlothar	Asteraceae	Herb	F	Leaves	Juice of crushed leaves applied to stop bleeding from the nose



59.	<i>Eupatorium cannabinum</i> L.	Hlothar	Asteraceae	Herb	A	Leaves	Juice of crushed leaves applied to stop bleeding from the nose as haemostatics
60.	<i>Euphorbia royleana</i> Boiss	Chawng	Euphorbiaceae	Shrub	VF	Pith & leaf	Pith & unripe fruit of papaya is cooked with chicken & the water is taken against diseases of the liver & chronic fever; milky juice is used externally for ring worm, rheumatism, boils, warts, etc.; Juice of heated leaves is applied to earache
61.	<i>Ficus bengalensis</i> L.	Hmawng	Moraceae	Tree	F	Latex, Bark, Seed, leaf & root	The milky juice is applied externally for pains in rheumatism, lumbago. Infusion of bark is used as tonic, astringent, used in dysentery, diarrhoea & diabetes. Seed is used for cooling tonic, leaves are applied as poultice to abscesses and root fibre in gonorrhoea
62.	<i>Ficus prostate</i> Buch-Ham.	Theitit	Moraceae	Epiphyte	F	Root	The root is crushed and the juice is applied for the remedy against poisoned snake bites
63.	<i>Ficus religiosa</i> L.	Hmawngnhahzum	Moraceae	Tree	C	Bark, leaf	Astringent, anti-gonorrhoeic, antidysentric, febrifuge, scabies, piles; leaf & young shoots are used as purgative & in skin diseases
64.	<i>Ficus semicordata</i> Buch-Ham. Var. conglomerata (Roxb.) *	Thenpui	Moraceae	Small tree	C	Bark & leaf	Liver ailment
65.	<i>Flemingia macrophylla</i> (willd.) Prain*	Tuisithing Lalram*	Fabaceae	Shrub	R	Roots	Decoction of root is used as external application in swellings & pain in the body [N fixer & prevent soil conservation]
66.	<i>Garcinia cowa</i> Roxb.	Chengkek	Clusiaceae	Tree	C	Leaf & bark	Bark & bark are antidiarrhoeal, antileprotic & also used in ulcer
67.	<i>Garcinia lancaeaefolia</i> Roxb. *	Pelhte	Clusiaceae	Tree	R	Leaf & fruit	Stomachache
68.	<i>Garcinia pedunculata</i> G.*	Theipumlian	Clusiaceae	Tree	R	Fruits	Acidic pericarp extract solution is mixed with sugar & is taken orally against dysentery & diarrhoea
69.	<i>Gardenia coronaria</i> Ham.*	Rul-hluah* Lalran	Rubiaceae	Tree	R	Root & leaf	The infusion of roots & leaves are taken orally against snake bite @ 50 ml. (twice daily)
70.	<i>Garcinia sopsopia</i> Ham.*	Thensaker	Clusiaceae	Tree	R	Branches	Snake-bite

71.	<i>Giardinia palmata</i>	Kangthai	Urticaceae	Tree	A	Root	The root is crushed & the juice is taken against food allergy e.g. pork
72.	<i>Gmelina arborea</i> Roxb.*	Thlanvawng	Verbenaceae	Tree	F	Flowers& fruit	Decoction of flowers is orally used for hypertension; Roasted fruit is applied externally in itches
73.	<i>Gynocardia odorata</i> R.Br.	Saithei	Flacourtiaceae	Tree	R	Seed-oil	The fruits are crushed & the seeds are extracted & used as lotion in leprosy & other skin diseases
74.	<i>Hedychium spicatum</i> Koenig.	Kelhnamtur	Zingiberaceae	Herb	F	Rhizome	The rhizome is used in stomachache, carminative, tonic, stimulant, expectorant, liver problem, vomiting, inflammatory & pains; also used in snakebite
75.	<i>Hedychium coronarium</i> Koenig.	Ai-lalnu	Zingiberaceae	Herb	R (cultivated in home gardens)	Rhizome	Base of stem is used for swellings & rhizome is used as febrifuge & antirheumatic
76.	<i>Hedyotes scandens</i> Roxb.	Laikingtuibur	Rubiaceae	Climber	C	Whole plant	The whole plant is boiled and the water is taken for the remedy against swelling, malaria & kidney problem
77.	<i>Helianthus annus</i> L.	Nihawipar	Asteraceae	Herb	F	Seed	Seed-diuretic, expectorant, febrifuge, stomachache, in bronchitis and in laryngeal & pulmonary infections.
78.	<i>Imperata cylindrica</i> Linn.	Di	Poaceae	Grass	A	Root	Juice of roots is used for the removal or expelling of the intestinal worms
79.	<i>Inula cappa</i> DC.	Buarthau	Asteraceae	Shrub	F	Leaf	The leaves are crushed with those of <i>Plantago asiatica</i> & <i>Lobelia angulata</i> & the juice is taken orally for diabetes & jaundice
80.	<i>Ixora nigricans</i> R.Br.	Thainurual	Rubiaceae	Shrub/small tree	R	Leaf	Infusion of the leaves is prescribed for dysentery & colic problems
81.	<i>Jasminum nervosum</i> Lour.*	Hrurkha	Oleaceae	Shrub	A	Leaf	Stomachache & fever
82.	<i>Jatropha curcas</i>	Kangdamdawi	Euphorbiaceae				Nut is purgative; plant in scabies, eczema, in ring worm; twig is used as tooth brush in swollen gums
83.	<i>Juglans regia</i>	Khawkherh	Juglandaceae	Tree	F	Bark, leaf and fruit	Bark and leaf are antihelminthic; leaf astringent, tonic; fruit is antirheumatic

84.	<i>Justicia adhatoda</i> L.	Kawldai	Acanthaceae	Shrub	F	Leaf	The leaves are boiled and the water is taken internally @20 ml twice daily for 3 days against malaria fever. Leaf paste is applied on whole body for 24 hrs. & the patient takes bath on the 3 <sup>rd</sup> day. Aforesaid treatment is used to cure chronic malaria also
85.	<i>Justicia zeylanica</i> Medicus. ADPR 503*	Kawldai	Acanthaceae	Shrub	F	Leaf	Juice of crushed leaves is applied externally on cuts & wounds as haemostatics
86.	<i>Kalanchoe pinnata</i> (Lamk.) Pers.	Zihor	Crassulaceae	Herb	R (introduced & naturalized)	Leaf	Scorched leaf to be applied on forehead in vertigo
87.	<i>Laggera crispata</i> (Vahl.) Hep. & Wd.*	Runhthung	Asteraceae	Herb	C	Leaf	Leaves are crushed & applied on sores
88.	<i>Lagerstroemia speciosa</i> (Linn.) Pers.	Chawnpui/Thlado	Lythraceae	Tree	F	Root, Bark	Decoction of root is taken for jaundice and infusion of bark is taken for diarrhoea and dysentery
89.	<i>Lannea coromandelica</i> (Houtt.) Merr.*	Tawitawsuak	Anacardiaceae	Tree	C	Bark, leaf	Bark- astringent, in ulcers and sore; leaf used in swellings, sprains & pain of the body
90.	<i>Lantana camara</i> Linn.	Hlingpangpar	Verbenaceae	Shrub	A	Leaves	Antirheumatic, antimalarial, in tetanus, diaphoretic, carminative & antispasmodic
91.	<i>Lindernia ruelloides</i> Pennell*	Thasuih	Scrophulariaceae	Herb	F	Whole plant	Externally used for Rheumatism, sciatica, skin worms, wounds & also internally for eye problems
92.	<i>Litsea cubeca</i> Roxb.	Sernam	Lauraceae	Tree	F	Fruit	Fruit is antiparalytic, anticephalagic, antihysteria, carminative, in dizziness & in loss of memory
93.	<i>Mallotus roxburghianus</i> Muell.-Arg.*	Zawngtenawhlung	Euphorbiaceae	Small tree	A	Twigs	In jaundice and hepatomegaly- twigs are boiled and the soup is taken daily/drank 1 cup (100ml) twice daily
94.	<i>Mallotus leucocarpus</i> (Kurz) Airy Shaw*	Sukiah	Euphorbiaceae	Small tree	F	Root	Used in colic problems
95.	<i>Melocalamus compactiflorus</i>	Sairil	Poaceae	Climber	F	Stem	Juice of stem is taken against as influenza
96.	<i>Mallotus philippensis</i> Muell.-Arg.	Bari khei	Euphorbiaceae	Tree	F	Stem bark	Gland and hair of fruit are antihelminthic, styptic, used in scabies, also in ring-worm & herpes
97.	<i>Melastoma malabathricum</i>	Builukham	Melastomataceae	Tree	F	Bark, leaf & flower	Bark is used as wound healer; leaf as antidiarrhoeal, antiseptic; leaf & flower top astringent & antileucorrhoeic
98.	<i>Melia azedarach</i> Linn.	Nim-suak	Meliaceae	Tree	Introduce-d & naturalize-d	Leaf	Decoction of leaves is taken orally against fever & hypertension

99.	<i>Melocanna baccifera</i> Roxb.	Mautak	Poaceae	Bamboo	A	Stem	The outer skin is scraped off & applied on cuts as haemostatics.
100.	<i>Merremia umbellata</i>	Vawktesentil	Convolvulaceae	Tree	C	Leaf	Poultice of leaves is applied on burns & sores
101.	<i>Mesua ferrea</i> Linn.	Herhse	Clusiaceae	Tree	F	Flower, bark & leaf	Flower is used as astringent, stomachache. Flowers and leaves are also used against snakebite & scorpion sting
102.	<i>Mikania micrantha</i> Kunth. WI	Japan-hlo	Asteraceae	Climber	A	Leaf	The leaf juice is a good haemostatic. The leaves boiled with that <i>Vitex penduncularis</i> is taken against fever. Also the leaf juice is good for dysentery
103.	<i>Ocimum tenuiflorum</i> Linn.	Runhmui-dum	Lamiaceae	Shrub	R; Cultivated in home gardens; often cultivated by chakma tribes	Whole plant	The plant is boiled & the steam is inhaled against hepatitis; infusion of the plant is used in cough, bronchitis, gastric disorders & as mosquito repellent
104.	<i>Oroxylum indicum</i> Linn.	Archangkawn	Bignoniaceae	Small tree	C	Root-bark, bark & seed	Root bark is used as tonic, anti-diarrhoeal; bark anti-rheumatic; tender fruit is carminative, used in stomachache; seed purgative; stem is antidote for scorpion sting
105.	<i>Osbeckia sikkimensis</i> Craib.	Builukhampa	Melastomataceae	Shrub	F	Root	Steamed roots & extracted solution is taken internally for renal disorder & genitor-urinary problems; decoction of roots is taken for kidney trouble & stomachache
106.	<i>Paedaria foetida</i> Linn.	Vawihuihru	Rubiaceae	Climber	C	Root & leaf	Plant-anti-rheumatic; root and leaf as tonic; root in piles, pain in chest and liver; leaf carminative, astringent, diuretic, in herpes
107.	<i>Pajenela longifolia</i> (Wall.)K. Schum.*	Ram-archangkawm	Bignoniaceae	Tree	R	Leaf & stem	Leaf & stem paste used in fracture
108.	<i>Parbarium hookerii</i> Pierre*	Theikelkibawr	Apocynaceae	Climber	F	Root	Decoction of roots taken as tea against placental disorders
109	<i>Parkia timoriana</i> Merr.	Zawngtah	Mimosaceae	Tree	A	Bark twig & pods	Decoction of bark & twigs is taken orally against diarrhoea & dysentery; green skin of the pods is turned into paste & applied on cuts & wounds; Chakmas use hot infusion of scraped pods for diarrhoea & dysentery
110	<i>Passiflora nepalensis</i>	Nauawimu	Pasifloraceae	Climber	A	Root	The root is boiled & the water is taken to cure malaria
111	<i>Pathos cathcartii</i>	Lehpong	Araceae	Epiphyte	F	Stem	Used in fracture of bone

112	<i>Pentapetes phoenicea</i> Linn.	Parsenbial	Sterculiaceae	Herb	VR	Leaf	The leaves are boiled & the water is taken for inflammatory glands, cough & cold; Juice of leaves is applied on inflammatory glands
113	<i>Phyllanthus fraternus</i> Webster.	Mitthi sunhlu	Euphorbiaceae	Herb	F	Whole plant	Infusion of plant @ 50 ml twice daily for diabetes; juice of whole plant is used for liver problems & jaundice; fruits & the plant parts are useful in thirst, bronchitis, leprosy, anaemia, urinary discharges, anuria & asthma
114	<i>Rauwolfia Serpentina</i> Benth.	Rulltuzung	Apocyanaceae	Herb	R( cultivated & naturalize-d at some places)	Root	Used in hypertension & stomach problems
115	<i>Ricinus communis</i> Linn.	Mutih	Euphorbiaceae	Shrub or small tree	R	Leaf & stalk	Young leaves after heating are used in ulcer, sciatica & paralysis while crushed leaves are applied as bandage against urinary problems
116	<i>Rhus acuminata</i> Murr.	Chhimhruk	Anacardiaceae	Herb	F		Leaf used in nausea; fruit- in colic problems; leaf excrescentas & in diarrhoea
117	<i>Rhaphidophora decursiva</i> Roxb.	Makhal	Araceae	Epiphyte	A	Stem & leaves	Used in fracture of bone after crushing the plant parts into paste
118	<i>Raphidophora hookeri</i> Schott.*	Thiallawn	Araceae		R	Stem	Helpful in easy labour
119	<i>Rubia cordifolia</i> L.	Rawngsen	Rubiaceae	Climber/ creeping herb	R	Root	Root is boiled & taken orally for kidney trouble & liver ailments; used in gonorrhoea, syphilis & renal infections
120	<i>Saraca asoca</i> Roxb.	Mualhawih	Caesalpiniaceae	Tree	EN/VU	Bark	In ethnogynaecology: Bark is astringent, used in uterine inflation, in gonorrhoea & scorpion sting
121	<i>Schima wallichii</i> (DC.) Korthals	Khiang	Theaceae	Tree	A	Fruit, leaf & bark	Decoction of fruit is used for snake bite and insect bite; bark-rubefacient, antihelminthic, antigonorrhoeic; leaf- carminative
122	<i>Scoparia dulcis</i> Medic.	Perhpawng-chaw/ Hlothlum	Scrophulariaceae	Herb	C	Whole plant	The whole plant is crushed and the juice is taken for the remedy of kidney stone, jaundice & genitor-urinary troubles
123	<i>Securinega virosa</i> Roxb.	Saisiak	Euphorbiaceae	Shrub	F	Leaf	The leaves are boiled & the water is taken for bathing children suffering from scabies and measles
124	<i>Semecarpus anacardium</i> Linn.	Vawmbal-pui	Anacardiaceae	Tree	F	Fruit/ nut	Juice of fruit (nut) is applied externally on sprain & in rheumatism
125	<i>Senecio scandens</i> Buch.-Ham.	Sai-ek-hlo	Asteraceae	Climber	R	Leaf/aerial parts	Boiled leaves/aerial parts is used for ulcerated cancer/ulcers

126	<i>Sida acuta</i> Burm. F.	Khingkhieh	Malvaceae	Shrub	VF	Root	Crushed root applied on boils to suck out the pus. Also used in nervous, urinary & stomach/gastric diseases
127	<i>Smilax pervifolia</i> Roxb.	Kaiha	Liliaceae	Climber	A	Root	The root is grounded with old molasses or with coagulated lows milk mixed with water and taken orally for blood purification
128	<i>Smilax glabra</i> Roxb.	Tluang-ngil	Liliaceae	Climber	A	Root	Taken in uterine and stomach infection
129	<i>Solanum torvum</i> Linn.	Tawkpui	Solanaceae	Shrub	C	Seed	The crushed seed is applied to toothache and tooth decay
130	<i>Solanum khasianum</i> Cl. Var. chatterjeanum*	Athlo	Solanaceae	Shrub	R	Fruit/seeds	Used to expel tooth worms from the mouth
131	<i>Solanum nigrum</i> Linn.*	Anhling	Solanaceae	Herb	F	Whole plant	Infusion of the plant is prescribed for liver problem & dropsy
132	<i>Sonchus wightianus</i> DC.	Gangmula	Asteraceae	Herb	C	Root	In combination used as cardiac tonic
133	<i>Spondias pinnata</i> Linn.	Tawitaw	Anacardiaceae	Tree	F	Bark	The bark is refrigerant, used in dysentery and after mixing with water used in both auricular and muscular rheumatism
134	<i>Terminalia bellirica</i> Roxb.	Thingvandawt	Combretaceae	Tree	F	Fruit, bark & kernel	The fruit is taken for stomach problem, antidropsical, antileprotic, anti-inflammatory, anti-diarrhoeal, antibillious, antiasthmatic, anticephalagic, tonic in bronchitis, also in sore throat, & in diseases of eye, nose, piles; Bark-diuretic, used in anaemia, leucoderma; kernel-narcotic & aphrodisiac
135	<i>Terminalia chebula</i> Retz.	Reraw	Combretaceae	Tree	F	Fruit & bark	The fruit is taken against stomach problem, purgative, febrifuge, antiasthmatic, antidysentery, enriches blood, antiparalytic, in piles, cold, ophthalmia, sore throat, dental caries, bleeding & ulceration of gums, burns etc.; bark is diuretic & cardiotonic
136	<i>Tetracera sarmentosa</i> Linn.*	Hruithingdeng	Dilleniaceae	Tree	F	Bark	Decoction of bark taken orally for stomachache
137	<i>Tetrameles nudiflora</i> R.Br.*	Thingdawl	Tetramelaceae	Tree	C	Bark/leaf	Juice of bark/leaves dropped into orifice against ottoorea
138	<i>Thunbergia grandiflora</i> Roxb.	Zawngafian	Acanthaceae	Climber	R	Leaf	Juice of the leaves is used for diabetes, eye diseases & as an antiseptic in cuts & wounds

139	<i>Tinospora cordifolia</i> (DC.) Miers. Ex. Hook.	Theisawntlung	Menispermaceae	Shrub/climber	R	Stem, root & fruit	Stem used in stomachache, antispasmodic, anti-inflammatory, diuretic, emetic, antidiabetic, aphrodisiac, antiperiodic, in skin diseases, piles, anaemia; root-emetic, antileprotic; fruit-tonic, antirheumatic; stem & fruit together in jaundice
140	<i>Toona ciliata</i> Roem.	Teipui	Meliaceae	Tree	C	Bark & flower	Bark-astringent, tonic, antiperiodic, antidysenteric, in ulcers; flower-emmenagogue
142	<i>Trevetia palmate</i> Roxb.*	Kawhtebel	Araliaceae	Small tree	C	Leaf/root	The leaf is crushed and the juice is taken as an effective remedy for colic, stomachache and high blood pressure
143	<i>Uncaria sessilifructus</i> Roxb.	Ralsamkuai-ziksen	Rubiaceae	Climber	F	Leaf & root	Young leaves are boiled and taken orally against diphtheria; roots are boiled & the water is taken against excess bleeding.
144	<i>Urena lobata</i> Linn.	Sehnap	Malvaceae	Shrub	F	Root & leaf	Crushed root mixed with water as aphrodisiac; juice of leaves is used against rheumatism
145	<i>Veronia albicans</i> DC.	Dawn-do-u-pun	Asteraceae	Herb	C	Leaf	Infusion of leaves is warmed & then dropped into ear against ear-ache/ otorrhoea
146	<i>Vitex peduncularis</i> * Wall. ex. Schauer.	Thingkhawilu	Verbenaceae	Tree	F	Bark	The bark is boiled and the water is drunk in case of typhoid & malarial fever
147	<i>Vitis bifurcata</i> *	Hruiveikual	Vitaceae	Climber	C	Root	Crushed roots used to produce mucous substance which is applied externally on swellings & sciatica
148	<i>Trapa natans</i> var. <i>bispinosa</i> (Roxb.) Makino	Not Known	Trapaceae	Aquatic/ semiaquatic	CR/VU	Root	A part of nutritious diet
149.	<i>Trevetia palmate</i> Roxb.*	Kawhtebel	Araliaceae	Small tree	C	Leaf/root	The leaf is crushed and the juice is taken as an effective remedy for colic, stomachache and high blood pressure
150.	<i>Uncaria sessilifructus</i> Roxb.	Ralsamkuai-ziksen	Rubiaceae	Climber	F	Leaf & root	Young leaves are boiled and taken orally against diphtheria; roots are boiled & the water is taken against excess bleeding.
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154.	<i>Vitis bifurcata</i> *	Hruiveikual	Vitaceae	Climber	C	Root	Crushed roots used to produce mucous substance which is applied externally on swellings & sciatica
155	<i>Woodfordia fruticosa</i> Kurz.	Ainawn	Lythraceae	Shrub	R	Flower	The powdered flower is used externally on sores & ulcers
156	<i>Xylia xylocarpa</i>	Thinguk	Mimosaceae	Tree	F	Bark & seed	Decoction of bark is used in ulcer, gonorrhoea and diarrhoea; seed oil is antirheumatic, used also in piles, bark and seed oil are antileprotic
157	<i>Zanthoxylum armatum</i> DC.	Arhrikreh	Rutaceae	Small tree	R	Leaf, flower & fruit	The leaves are used towards off fowls and lice; fruit as appetizer, anticephalgic, antiasthmatic, antihelminthic, in leucoderma, eye & ear diseases, piles; flower used as antidote for snake bite
158	<i>Zingiber officinale</i> Rosc.	Sawthing	Zingiberaceae	Herb	Cultivated on large scale as cash crop	Rhizome & flower	Extract i.e. ginger oil is used in cough & bronchitis; rhizome is roasted & eaten against throat pain, applied as condiment; flowering bunches are sold in local market as vegetable
159	<i>Zingiber purpureum</i> Rosc.	Pale	Zingiberaceae	Herb	VU: Cultivate-d	Rhizome	Chakmas tribe use rhizome to cure stomachache & diarrhoea

R: rare; F: frequent; VF: frequent; VR: very rare; A: abundant; C: common; VU: Vulnerable; EN: Endangered; CR: Critically endangered

\*Those marked by asterisk represent the plants which were recorded for the first time.

## Discussion

Traditional knowledge of herbal remedy to treat human diseases is fast declining in many parts of the world, including India. Even today, tribals and certain local communities in India still practice herbal medicine to cure a variety of diseases and disorders. They collect and preserve locally available, wild and cultivated plant species.

Bio-resources of Mizoram comprise a great share of natural resources. The agroecosystems as well as natural ecosystems harbour immense genetic potential (Lalramnghinghlova 1999b; 1999c; 2002).

Lalramnghinghlova and Jha (1998) described more than 200 ethnomedicinal plants for their efficiency to cure diseases like bleeding from nose, fever, malarial fever, asthma, tuberculosis, calculi, stones in kidney, gall-bladder, urinary troubles, hypertension, diabetes, stomachache, stomach ulcer, dysentery, diarrhoea, jaundice, hepatomegaly, fracture of bone, gynec disorder and snake bite. They added that over 60% people living in the interior parts of the state depends upon herbal medicine. Further, Lalramnghinghlova and Jha (1997) identified and hand in hand characterized the ethnomedicinal plants based on IUCN threat categories.

Also, Lalramnghinghlova and Jha (1999) during their extensive survey of ethnomedicinal plants provided new records of aforesaid which has not been reported earlier in forests of Mizoram. Lalramnghinghlova (1999) marked



that although more works have been undertaken on ethnobotany, very less focus has been given to ethnozoology which is very necessary in order to address ethnobiology in its totality.

## Conclusions

Recent decades have seen significant changes occurring within several aspects of ethnomedicine as a result of environmental degradation and tremendous changes in modern, social, and economic systems. Due to aforesaid factors, acting in concert, the traditional knowledge system in India is fast eroding. Hence, there is an urgent need to record all ethnobotanical information among the diverse ethnic communities before the traditional culture is completely lost. Often, tribals are exploited by the modern societies and they are forbidden to use the forest resources with which their lives are strongly interwoven. Policy makers should secure the TEK of tribal people, whose socio-economic life is interwoven with the forests from where they derive all their material requirements, including their healthcare needs and foodstuffs. Further, we recommend that after survey, mapping and identification we have to have some collaborative and financial cooperation extended from governmental and scientific institutions to prepare a database of medicinal plants from Mizoram and also to extract the bioactive compounds responsible to treat the ailments. The claims emanating from the present survey need to be subjected to pharmaco-chemical studies in order to explore their true potential as it is very difficult to judge the effectiveness of folk medicine. The ethnomedicinal plants, particularly threatened ones, should be cultivated in herbal gardens, agroforestry systems and home gardens to encourage their sustainable utilization and hence conservation.

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