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## Status of threatened ethno- medicinal plants found in sub- alpine areas of Ukhrul and Senapati districts of Manipur

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### Abstract

Survey of threatened ethno-medicinal plants used by the communities residing in Manipur was carried out in the sub-alpine areas of Shirui and Dzukou valley of Ukhrul and Senapati districts of Manipur. A total of 18 taxa belonging to 16 families and 16 genera were collected and assessment for their distribution pattern, status, threats and conservation aspects were studied. Moreover, information regarding 18 taxa traditional collections and medicinal uses was also collected from the surrounding villagers. The present study records that the distribution pattern of the threatened plants was based on the differences in habitats and niches. Majority of the plant species population is drastically reduced due to several factors like habitat loss, overexploitation, improper collection methods and forest fires.

**Keywords:** Threatened, sub-alpine, taxa, overexploitation, forest fires

### Introduction

The state of Manipur lies in the North-easternmost part of the Indian sub-continent which is blessed with a unique biodiversity and diverse ecosystems with specific biological components. It falls under the Indo-Burma (IBR) hotspot region which ranks 8<sup>th</sup> amongst the 34<sup>th</sup> biodiversity hotspots region of the world (Meyers *et al.*, 2000) [11]. The flora of the state is blessed with nearly 4000 angiospermic plant species and with an approximate of 450 medicinal plants species. The Shirui National park and Dzukou valley are the two sub-alpine areas of the state where unique floral diversity occurs. The Dzukou valley and surrounding hills flora is represented by 335 species of sub-tropical, temperate and sub-alpine forest of which 6% of the plant recorded were endemic to the area or endemic to Eastern Himalayas (Mao & Gogoi, 2010) [10]. The rich diversity of plants originates from the variations in the climatic, altitudes and edaphic factors.

Since time immemorial the use of traditional medicine and consultations with traditional healers for the treatment of various primary health ailments is widely acknowledged in Manipur. The people of Manipur continued the use of folk-medicine till recent years even though modern medical science is well established. There have been many reports by different researchers on folkloric treatment with herbal medicine by the various communities in Manipur viz., Sinha (1987, 1996) [23, 24], Singh (2009) [16], Ahmed, M.M. & Singh, P.K. 2007 [1], Lokho, A. 2012 [9], Singson *et al.*, (2016) [17].

The Indo-Myanmar (Indo-Burma) hotspot is one of the most threatened hotspots globally: it ranks among the eight hotspots likely to lose most plants and vertebrates as a result of forest loss continuing at its current rate. A conservative estimate of the total plant diversity in the hotspot reveals about 13,500 vascular plant species, of which 7000 (52%) are endemic (Van Dijk *et al.*, 2004) [18]. The 2008 IUCN Red list shows that the number of threatened plant species is increasing gradually (www.iucnredlist.org).

Habitat degradation, unsustainable harvesting and over-exploitation to meet the demands of the mostly illegal trade in medicinal plants have already led to the extinction of more than 150 plant species in the wild (Singh and Rawat, 2011) [14] and unscientific collection of drugs from natural habitat only (Shankar R & Rawat MS, 2013) [13]. The continuous exploitation of several medicinal plant species from the wild (Kala, 2003) [7] and substantial loss of their

habitat during past 15 years have resulted in population decline of many high value medicinal plant species over the years.

Except few reports there is insufficient information about the availability of the threatened ethno-medicinal plants of Manipur with regards to their distribution, status, habitat and traditional methods of collection. Considering these aspects, the present study is an attempt to record a detail vegetation study of the threatened medicinal plants found in sub alpine region of Manipur. Moreover, the causes of disappearance, mode of collection and best conservation and management approach for the observed species will also be discussed. This will allow an appropriate conservation measures as a guide to future conservation efforts of some threatened ethno-medicinal plants.

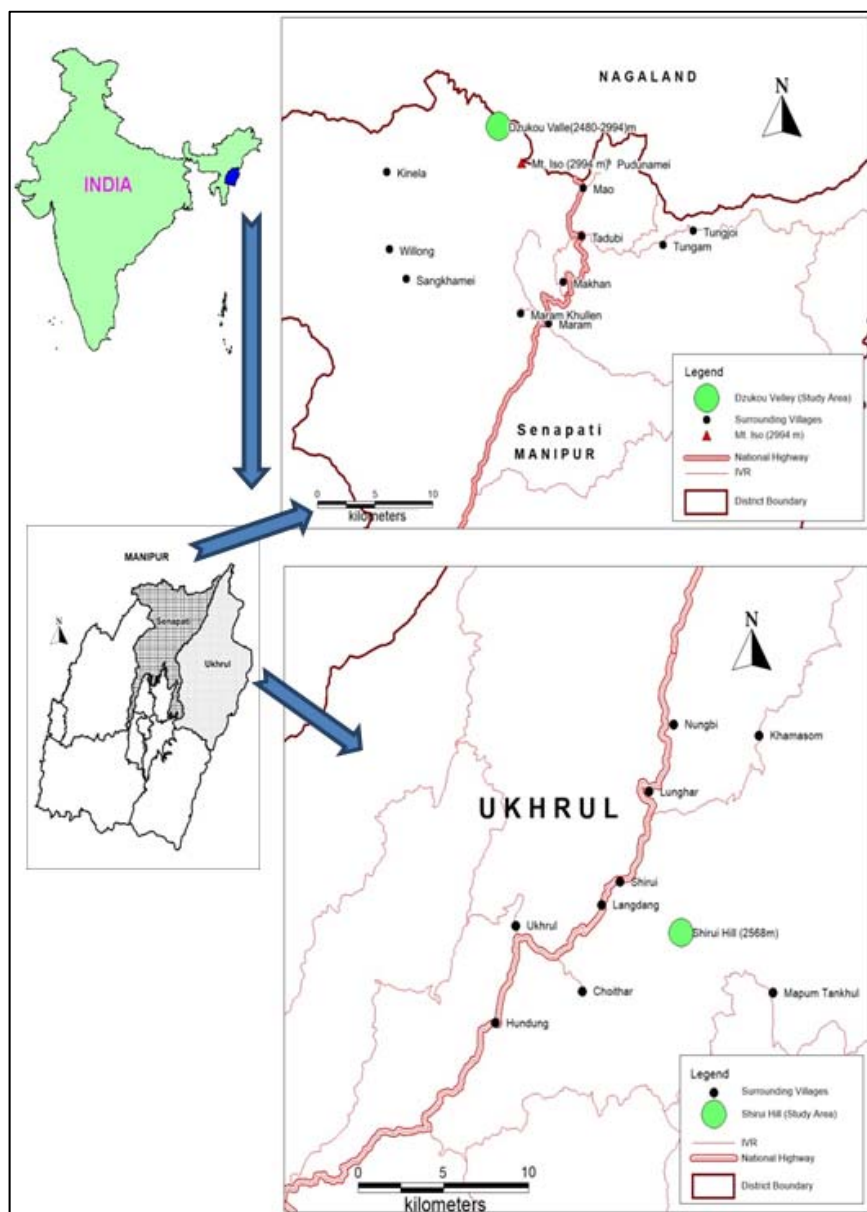
**Material and methods**

**Study area**

The Shirui National park was established in 1982 is located in Ukhrul district of Manipur. It is famous for Shirui lily

(*Lilium mackliniae* Sealy). The park lies between 25°7.439'N latitude and 94° 26.386'E longitude and covering an altitudinal range of 1,730-2,590 MSL. The Annual rainfall of the district is 1763.7mm and average annual temperature (33° C Max & 3° C Min).The highest peak found in Khayangbung which is 2,835m above sea level.

The second study site Dzukou valley is situated at the border of the states of Senapati districts of Manipur and Nagaland. The valley lies between 25°33.258'(25° 33'15.5") N latitude and 94° 4.028'(94° 4'1.7") E longitude with an area of about 27sq. km. It lies at an altitude between 1061m to 2994m (AMSL). Mt. Iso (Mt. Tenipu) is the highest mountain peak which is about 2994m in Manipur. The temperature ranges from a minimum of 3.4° C to a maximum of 34.1° C and having annual rainfall ranges from 670 to 1,450 mm. The study sites of the Ukhrul and Senapati were depicted in the fig.1 given below.



**Fig 1:** Map showing the study sites of Dzukou valley and Shirui hill of Manipur

### Data collection

Several collection cum survey tours were undertaken in the study sites (Shirui and Dzukou) of Manipur during April 2015 to February 2017. The plants were identified using flora of Clarke, 1889 [3]; Kanjilal *et al.*, (1934-1940) [8]; Deb (1961 a, b); Sinha, (1987 a, b) [23]; Singh *et al.*, 2000 [21]; Mao & Gogoi, 2010 [10]. Regarding ethno-medicinal uses, reports from Sinha 1996 [24]; Singh *et al.*, 2003 [15]; Singh, 2009 [16]; Sumitra *et al.*, (2009, 2011); Lokho, 2012 [9]; Ningombam *et al.*, 2014 [12]; Singson *et al.*, 2016 [17]. The herbarium sheets are prepared following Jain and Rao 1977 and deposited for inclusion in the herbaria of Department of Botany, Nagaland University, Lumami, India. Author name

of plants follows Brummitt & Powell 1992 [2] and the plants names were updated using International Plant Name Index (www.ipni.org) database.

### Results

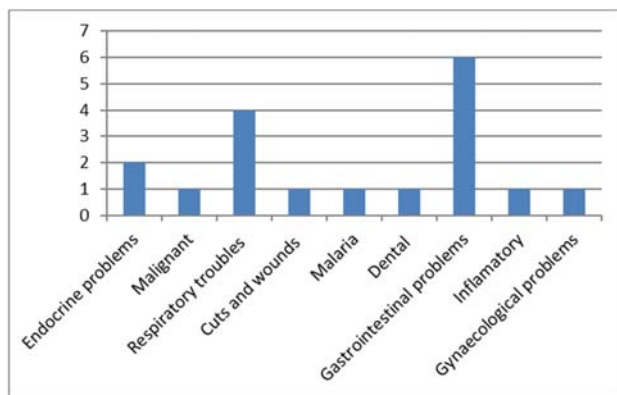
The present study was done in a total of 25 sample plots, 10 of which at Shirui hills and 15 at Dzukou valley areas. Altogether 18 species belonging to 16 families were recorded of which herb is represented by 8 species, shrub - 2, tree - 5, creeper- 2 and 1 species of orchid. The enumeration of the 18 species recorded along with their uses, distribution, locations in the present study and status of the plant is given below in Table. 1.

Sl.	Species/ Family/Local Name	Reported uses	Present study	Distribution pattern	Present status.
1	<i>Aconitum elwesii</i> Stapf. / Ranunculaceae./Nuishiwon MUMP-000125	Tuber is used as febrifuge and abdominal pain.	<i>Ukhrul</i> : Shirui Chingkha, Lunghar and adjacent hills. <i>Senapati</i> : Dzukou valley	<i>In India</i> : Sikkim, West Bengal, Manipur & Nagaland	Scattered and disjunct populations in the two study sites are getting badly affected by forest fires.
2	<i>Aconitum nagarum</i> Stapf/ Ranunculaceae./Khawari. MUMP-002340	The root is used as poison for killing wild animals by the Nagas.	<i>Ukhrul</i> : Shirui, Jessami and adjacent hills <i>Senapati</i> : Dzukou hills and adjacent hills of Mao-Maram.	<i>In India</i> : Arunachal Pradesh, Manipur & Nagaland	Very low populations and restricted fragmented distribution in both the study sites
3	<i>Arisaema lobatum</i> Engl./Araceae <i>Leencheisu</i> MUMP-002341	Tubers applied as antiseptic to malignant sores	<i>Ukhrul</i> : Shirui, Langdang, Choithar <i>Senapati</i> : Dzukou, Mao, Makhani	Northeast India, Central & Southern China, South-east Asian countries	Habitat destruction by surrounding villagers.
4	<i>Begonia adscendens</i> C.B. Clarke/ Begoniaceae/ <i>Banhang</i> (in Rongmei) MUMP-000127	Whole plant is used in cough and dysentery.	<i>Ukhrul</i> : Shirui, Lunghar, khamasom, Nungbi <i>Senapati</i> : Dzukou, Mt. Iso, Tungjoi	Assam to Myanmar, S. Laos	Loss of habitat due to forest fire.
5	<i>Bulbophyllum japonicum</i> Makino/ Orchidaceae MUMP-002345	Bulb used in treatment of cracks and cuts and wounds	<i>Ukhrul</i> : Shirui, Khamasong, Hundung <i>Senapati</i> : Dzukou, Mt Iso	Japan, Taiwan, South-east China.	Forest fires, timber collection and trade of the plant
6	<i>Cinnamomum verum</i> J. Presl./ Lauraceae/ <i>Using-sha</i> MUMP-002350	Bark and root used in bad breath / mouth freshener	<i>Ukhrul</i> : Shirui, Lunghar, Choithar <i>Senapati</i> : Dzukou, Mao-Maram	<i>India</i> : Northeast India and western Ghats	Population decline due to overharvesting, market demand and unsustainable collection methods
7	<i>Dichroa febrifuga</i> Lour/ Hydrangeaceae./Barak(Hindi) MUMP-002351	Root used for treatment of malaria	<i>Ukhrul</i> : Shirui, Khamasong, Khayangbung <i>Senapati</i> : Mt. Iso	China, Bhutan, Cambodia, India	Habitat degradation, forest fires.
8	<i>Elsholtzia strobilifera</i> Benth/ Lamiaceae/ <i>Lomba</i> MUMP-002354	Inflorescence used in Toothache	<i>Ukhrul</i> : Shirui, Lunghar, Hundung, Langdan <i>Senapati</i> : Mao, Tadubi, Tungjoi	India, Nepal, China and Taiwan	Forest fires and habitat destruction an growth of invasive and alien species
9	<i>Eurya acuminata</i> DC./ Theaceae/ <i>Sijou</i> MUMP-000129	Leaf used food & Respiratory problems	<i>Ukhrul</i> : Adjacent Shirui hill <i>Senapati</i> : Makhani, Maram-khullen, Tungjoi	China, Bhutan, India, Indonesia, Malaysia, Myanmar, Nepal, Sri Lanka, Thailand, Vietnam.	Habitat destruction and locally traded
10	<i>Lilium mackliniae</i> Sealy/ Liliaceae./ <i>Kashong Timrawon</i> MUMP-002360	Rhizome decoction used in stomach troubles	Only at Shirui hill	<i>India</i> : Endemic in Manipur	Localised in patches and are getting badly affected due to forest fires and overgrowth of <i>Yushania rollaona</i> (Gamble) T.P. Yi.
11	<i>Mahonia napualensis</i> D C. /Berberidaceae./Yaiganmachurong/U-napu MUMP-002362	Bark is used in Dizziness. Tender shoots are used as wild edible food	<i>Ukhrul</i> : Langdang, phangrei, Shirui hill. <i>Senapati</i> : Dzukou and Mao-Maram	<i>India</i> : Nagaland, Manipur, Arunachal Pradesh, Assam, Meghalaya & Sikkim	Very less population has declined due to habitat loss. Indiscriminate collection of bark and young shoots leading to death of the plant
12	<i>Paris polyphylla</i> Sm/ Melanthiaceae./Haw-pan/Kazeapai MUMP-002365	Tuber used in Bronchitis, stomach ulcers, diarrhoea, dysentery, sore throat, Anthelmintic, tonic, respiratory problems	<i>Ukhrul</i> : Shirui, Khayangbung, Lunghar <i>Senapati</i> : Dzukou, Makhani, Maram	<i>India</i> : Jammu & Kashmir, Sikkim, Arunachal Pradesh, Nagaland and Manipur	Population has greatly declined due to overexploitation and improper collection methods for market demand in both study sites
13	<i>Piper griffithii</i> C.DC./ Piperaceae/ <i>Chingmarich</i> MUMP-000130	Inflorescent and seeds is used in Gastrointestinal Problems	<i>Ukhrul</i> : Shirui & adjacent hills. <i>Senapati</i> : Dzukou, Makhani, Maramkhullen,	<i>India</i> : Assam, Arunachal Pradesh, Meghalaya, Sikkim, west Bengal.	Low population and restricted fragmented distribution

			Tungjoi		
14	<i>Rhododendron arboretum</i> Sm./ Ericaceae/ <i>Kokliwon</i> MUMP-000134	Young shoots and flowers is used for easy deliver Of child or child birth.	<i>Ukhrul:</i> Shirui, Lunghar, Khayangbung, <i>Senapati:</i> Dzukou, Mount Isii, Makhon village	<i>In India:</i> Manipur, Nagaland, Arunachal Pradesh	Population decline due to forest fires and habitat destruction
15	<i>Rubia cordifolia</i> L. / Rubiaceae/ <i>Moyoom</i> MUMP-002367	Roots, stem and leaves Used in rheumatism, anti-inflammatory,	<i>Ukhrul:</i> Shirui, Lunghar, Khayangbung, Choither <i>Senapati:</i> Dzukou, Mount Isii, Moa, Maram	Asia, Africa and Australia. In India: North east India.	Population decline due to habitat loss, forest fire and low regeneration
16	<i>Swertia angustifolia</i> Buch.–Ham. Ex D.Don / Gentianaceae./ <i>Chiraita</i> MUMP-000138	Young shoots used in Jaundice, fever, cough, stomach ulcers, diabetes and indigestion	<i>Ukhrul:</i> ShiruiChingkha, Jessami and adjacent hills. <i>Senapati:</i> Dzukou hills and Mao	<i>In India:</i> Endemic to Manipur & Nagaland	Population declined due to habitat destruction.
17	<i>Thalictrum foliolosum</i> DC./ Ranunculaceae./ <i>Kharuri</i> MUMP-002370	Rhizome used in Scabies, stomach-ache, cold and fever, Diuretic, antiperiodic, astringent	<i>Ukhrul:</i> Shirui Chingkha, khayangbung and adjacent hills <i>Senapati:</i> Dzukou hills and Mao	<i>In India:</i> Nagaland, Manipur, Assam, Meghalaya	Population declined due to unsustainable collection, habitat destruction and forest fires.
18	<i>Zanthoxylum acanthopodium</i> DC. / Rutaceae/ <i>Mangnangthei</i> MUMP-002380	Leafs and seeds used in cold and tonsillitis	<i>Ukhrul:</i> Shirui hills & adjacent hills. <i>Senapati:</i> Adjacent Dzukou hills	Bangladesh, Bhutan, India, Indonesia, Laos, Malaysia, Myanmar, Nepal, Thailand.	Overharvesting of seed, habitat destruction and forest fires.

**Discussion**

The Shirui National park and Dzukou valley are sub-alpine region blessed with high diversity of flora and rare medicinal plants. In the present survey out of the 18 medicinal plants recorded that herbs constitutes 44% of the total plants follows by tree 28%, shrubs 11%, creepers 11% and orchids by 6%. The medicinal plants recorded were used in the treatment of 9 major ailments by the different communities residing in the Manipur. Among which gastrointestinal problems constitutes the highest, follows by respiratory troubles as shown in the Fig 2.



**Fig 2:** Chart showing the no. of species used for the treatment of major types of ailments

These medicinal plants were found only in natural ecosystems, growth of them in such hilly regions, has made them an important economical resource for poor people in these regions. Export of these species to neighbouring states and countries like Myanmar, China etc., is also a major concern. Overexploitation of *Paris polyphylla* species from wild for its market value without proper collection methods leads to the decline in the population of the species. The present study also found that there is very less effort for conservation and sustainable utilization of the threatened medicinal flora. The major cause of decline in population are habitat destruction (50%), follows by trade of plant (33, 34%) and forest fires (16.67%). The communities residing

in the study sites were heavily depends on forest resources for their livelihoods. Moreover the localities collected these medicinal plants in a very unsustainable way which leads to disappearance from wild. Shifting cultivation practices often result in forest fires within the national park. Strong winds, in relatively dry bamboo species on the ridges, increase the risk of uncontrolled fires during the dry season. The biological integrity of study sites is being threatened by these uncontrolled fires.

With the increasing demand of economic forces including demand of timber, medicinal plants, jhum cultivation and forest fires for collection of wood, charcoal, lack of grassroots support for conservation aspects and global climate change leads to drastic decline in the population of the studied species.

**Conclusion**

The sub-alpine regions under study contain many species which have narrow area of distribution. An area specific threat categorization of species is very important for short or long term management planning. If the overexploitation and habitat degradation of these species continues may disappear from the area within a few years.

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