

ETHNO-VETERINARY TRADITIONS AMONG THE MISHMI TRIBE IN ANJAW DISTRICT, ARUNACHAL PRADESH: DOCUMENTATION AND INSIGHTS

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ABSTRACT

Ethno-veterinary practices denote the traditional veterinary knowledge and procedures developed and employed by numerous cultures and indigenous communities globally. The study was conducted in Anjaw district of Arunachal Pradesh during 2021. The research design employed was descriptive and the study adopted a multistage purposive cum random sampling approach. A total of 11 villages from 4 CD-blocks were randomly selected for the study making it to a total of 44 villages for this study. Altogether, 220 respondents were considered for the study. The identified ethno-veterinary medicinal plants used by the Mishmi tribe were *Zanthoxylum oxyphyllum*, *Gynocordia odorata*, *Daturastramonium*, *Prunuspersica*, *Camellia sinensis*, *Bambusa spp.*, *Tinospora cordifolia*, *Nicotiana spp.*, *Stephania japonica*, *Syzygium spp.*, *Ricinus communis* and *Coptisteeta*. The identified plants were employed for various purposes such as anti-tick and anti-maggot agents, insect repellents, treatment for skin infection, fever, and eye infection, as well as accelerate the healing of cut wounds. The justification for the utilization and efficacy of the ethno-veterinary practices outlined in the study relied on the perspectives and opinions of the practitioners. Ethno-veterinary practices reflect a profound connection between their indigenous knowledge, cultural traditions, and sustainable animal healthcare, offering valuable insights for conservation and community well-being.

(Key words: Arunachal Pradesh, ethno-veterinary, Mishmi, indigenous, traditional, knowledge)

INTRODUCTION

Ethno-veterinary practices refer to the indigenous veterinary knowledge and techniques that have been developed and used by various cultures and indigenous communities around the world. The history of ethno-veterinary care for animals parallels the domestication of different livestock species. The use of natural products including animals, minerals, and plants resources for medicinal purpose by man in an attempt to treat a wide array of maladies emanates even before recorded history (Balaji and Chakravarthi, 2010). These encompass attitudes, expertise, methods, and abilities pertaining to the care and handling of animals, passed down through generations and plays a vital role in the healthcare of livestock and working animals in many parts of the world, especially in rural areas where access to modern veterinary services may be limited. Plant resources form an integral part of traditional agricultural and rural livelihood systems, where both medicinal and nutritionally important species contribute to human and animal well-being (Kumar *et al.*, 2024, Pandey and Joshi, 2024).

Arunachal Pradesh located in the north-eastern region of India has a deeply rooted connection between the

people and the forests, with strong ties to wildlife and a close interdependence that is closely intertwined with their animistic religion. The *Mishmi* tribe, one of the major communities in Arunachal Pradesh, is comprised of three sub-tribes: *Kaman (Miju) Mishmi*, *Tawrah (Digaru) Mishmi*, and *IduMishmi*. The *Kaman* and *Tawrah Mishmi* communities reside in the Lohit and Anjaw Districts, while the *Idu Mishmi* people primarily inhabit the Dibang Valley and Upper Dibang Valley Districts, with a smaller population in the Upper and East Siang Districts of Arunachal Pradesh. The identification and documentation of medicinal plants that ethnic cultures have historically utilised to treat animal ailments has come a long way in recent years in different parts of India and in Northeast. Documentation of these practices in the state has not received proper attention, primarily because of the tribal population in the region and its remote geographic location. There is a need to generate awareness among the local population towards the sustainable utilization and conservation of these medicinal plants.

MATERIALS AND METHODS

The study took place in the Anjaw district of Arunachal Pradesh from 2021. The research design

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employed was descriptive, and a multistage purposive cum random sampling design was adopted for the study. Anjaw district was purposively selected for the present study. The district of Anjaw consists of 4 CD-blocks viz, Hayuliang-Goiliang CD-block, Manchal CD-block, Chaglagam-Metengliang CD-block and Hawaii-Walong CD-block. The *Taraon/Tawrah Mishmi* people predominantly reside in the Hayuliang-Goiliang block and Chaglagam-Metengliang blocks, while the *Kaman Mishmi* people inhabit the Manchal block and Hawaii-Walong block. For this study, 11 villages were randomly chosen from each block, resulting in the selection of 44 villages overall. Consequently, the final sample for this study comprised 220 respondents. An interview schedule was prepared based on the objectives set for the study. Primary data was collected from the

respondents through personal interview and group discussion. In this study, the effectiveness of ethno-veterinary practices was assessed by using a structured schedule with five options, viz., no success, up to 25% success, up to 50% success, up to 75% success, up to 100% success where score ranges from 0 (no success) to 4 (up to 100% success). Each respondent was asked to put his/her opinion against each practices as per his/her experience in any one of the above mention alternatives as outlined by Talukdar *et al.* (2012).

The effectiveness scores were collected only for those practices that were still practiced at the time of survey. The effectiveness score of each practice was computed using the formula:

$$E_x = \Sigma X_i/n,$$

where X_i = effectiveness score of i^{th} respondent for a particular practice (say, X),

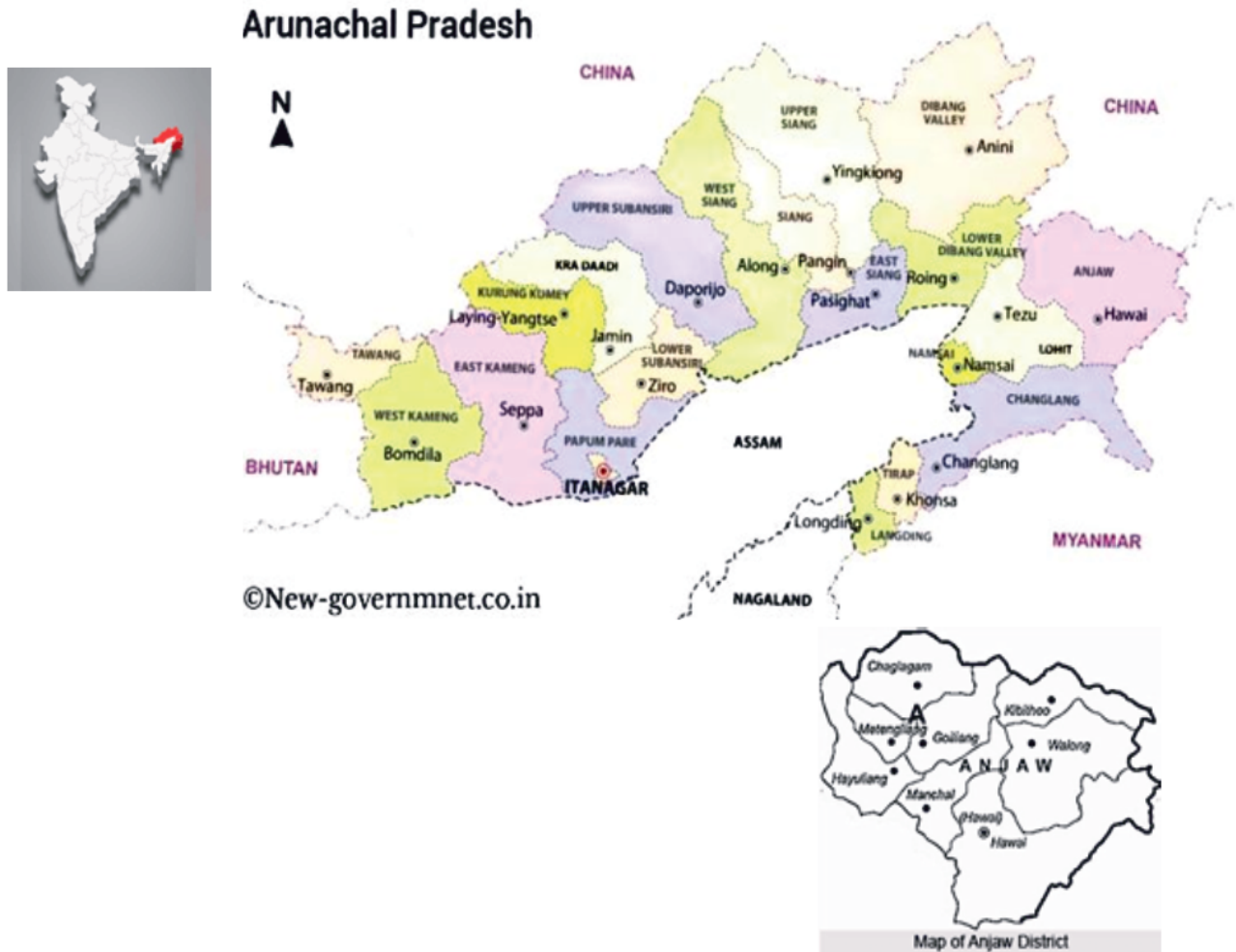
ΣX_i = summation of individual respondent-wise effectiveness score for a particular practice,

n = number of respondents who furnished response as to effectiveness of a particular practice (say, X),

E_x = effectiveness score of a particular practice (say, x).

On the basis of the effectiveness score calculated, all the practices identified during the study were categorized as Less effective, Moderately effective and Highly effective.

Figure 1. Map showing Anjaw district of Arunachal Pradesh



RESULTS AND DISCUSSION

Zanthoxylum oxyphyllum

Zanthoxylum oxyphyllum, known locally as *Mazang/Matha* belongs to the Rutaceae family, is a highly versatile and extensively distributed plant species. The *Zanthoxylum* plant is highly valued for its aromatic and medicinal properties which also demonstrate insect repellent and insecticidal/larvicidal properties against many pests (Kaleeswaran *et al.*, 2019). The method involves feeding mithun with one to two tender leaves or half a teaspoon of dried seed powder mixed with common salt which serves as an effective anti-tick for animals such as mithuns. The use of *Mazang/Mathā* (*Zanthoxylum oxyphyllum*) as an anti-tick was found to be practiced by three respondents from the villages of Kanning, Manchal, and Surnung. The effectiveness of this ethno-veterinary practice was perceived as up to 100 per cent by the users. The majority of the respondents were aware of such practice or had learned about it through others but never applied it, possibly due to the availability of modern medicines, and the fact that the animal being wild was overlooked.

Gynocordia odorata

Gynocordia odorata, known locally as *Tahmah-shung/Lükap-ashang*, belongs to the Achariaceae family and holds significant medicinal value for the *Mishmi* community. In Anjaw district, many residents perceive the plant as poisonous and employ it as an insecticide, vermifuge, and piscicide, as well as to repel bees. The tree bark is collected and crushed, and then applied to wounds as a remedy against maggots. The use of *Tahmah-shung/Lükap-ashang* (*Gynocordia odorata*) as an anti-maggot was found to be practiced by none of the users. The use of this plant as ethno-veterinary practice was reported from Manchal circle and Hawai circle. Many respondents were found to be unaware of this ethno-veterinary practice, possibly because it was not transmitted across generations. When a traditional knowledge and practice is not actively used in the present, it tends to discourage its continuation in the future, leading to a gradual fading away of associated knowledge and skills. Also, users may have experienced difficulties to avail this required plant when they needed it the most, which could have discouraged the use of this ethno-veterinary medicinal plant.

Datura stramonium

Datura stramonium commonly referred to as jimson weed, known locally as *Mokya/Bruphala* among the *Mishmi* community in the Anjaw district. This Solanaceae plant is known for its medicinal as well as poisonous properties and has been proven to have great pharmacological potential with a great usage and utility in folklore medicine (Soni *et al.*, 2012). To combat maggots, the crushed leaves of *Datura stramonium* are applied directly into the wounds. The use of *Mokya/Bruphala* (*Datura stramonium*) as an anti-maggot was found to be practiced by a single respondent from Manchal village. This ethno-veterinary practice is rarely

adopted, only when necessary, due to its poisonous nature. The respondent perceived the practice as up to 100 per cent effective. Most of the respondents were found to be aware of such practice but did not apply it.

Prunus persica

Prunus persica known locally as *Aman-sit/Haquum-sik* among the *Mishmi* community belongs to the family Rosaceae and is widely consumed worldwide under the popular name peach. Fresh leaves of peach plants are crushed, and are utilized as a remedy against maggots by applying them directly to wounds. This plant holds significance as an important medicinal plant, exhibiting a range of medicinal activity. The leaves of the peach plants are also used as an anthelmintic, insecticidal, laxative, sedative and vermifuge (Haleema *et al.*, 2020). The use of *Aman-sit/Haquum-sik* (*Prunus persica*) as an anti-maggot was found to be practiced by a single respondent from Amliang village. The respondent perceived the effectiveness of this practice to be up to 100 per cent effective. While most of the respondents were aware of other ethno-medicinal practices involving this plant, they were not aware of its specific application as an ethno-veterinary practice.

Camellia sinensis

Camellia sinensis, known locally as *Phalap/Phalam*, which means tea. *Phalap/Phalam* is an evergreen shrub or medium-sized tree belongs to *Theaceae* family. Fresh leaves of this plant from the wild are gathered, crushed, and applied to the fresh cut wounds resulting from the castration of piglets to aid in the healing process. None of the respondents were found to adopt the use of *Phalap/Phalam* (*Camellia sinensis*) for wound healing after piglet castration. It was learned that the practice of piglet castration was rarely performed due to the lack of locally skilled individuals capable of carrying out such operations. In the past, when connectivity was poor, people in remote villages had to handle every problem themselves. Consequently, skilled personnel were present within the community who could perform such operations which utilize traditional practices. However, as time passed and people with such expertise were lost, the associated knowledge and skills gradually diminished.

Bambusa spp.

Bambusa spp. are diverse group of evergreen perennial plant of the grass family. *Bambusa spp.* is known locally as *Wah/Hwü* among the *Mishmi* community. Here *maiwal/takeh* means skin of the bamboo. The thin layer of bamboo skin is carefully scraped using sharp objects, and the peeled skin is collected and crushed. This powder is then applied to fresh cuts in order to effectively stop bleeding. There were no users of *Wah-maiwal/Hwü-takeh* (*Bambusa spp.*) for healing wounds. The application of *Wah-maiwal/Hwü-takeh* to control minor bleeding from cuts was primarily adopted as an emergency measure for both humans and animals. However, it was discovered that the use of other ethno-veterinary medicinal plants, such as *Maiwan/*

Mepüng, was easier to apply, as reported. This difficulty of application may be a contributing factor for the lower adoption or no adoption of this practice.

Bryophyta

Mosses are small, non-vascular flowerless plants in the taxonomic division bryophyte, known locally as *Maiwan/Mepüng* among the *Mishmi* community in the Anjaw district. Following collection, mosses are crushed and employed to halt bleeding by direct application onto wounds. The use of *Maiwan/Mepüng* (*Bryophyta*) to heal wounds was found to be practiced by four respondents from the villages of Kaning, Roiliang, and Kamlat. Among them, two respondents from Roiliang and one from Kaning perceived the effectiveness of this practice to be up to 50.00 per cent, while another respondent from Kamlat village perceived it to be up to 75.00 per cent effective. This plant is easily available in the rocks surface and in trees. The varying responses among users may be attributed to their individual experiences and skills while using these remedies to treat ailments, influenced by their personal situations.

Tinospora cordifolia

Tinospora cordifolia belongs to family Menispermaceae is a herbaceous vine that grows over other trees. *T. cordifolia* called as *guduchi* in Sanskrit is known locally as *Amuk-bran/Tamyamtatshüy* among the *Mishmi* tribe in the Anjaw district of Arunachal Pradesh. This plant is known to have been used in Ayurveda for treatment of various diseases (Tamang *et al.*, 2023). The *Mishmi* tribe residing in the Anjaw district utilizes the sap extracted from freshly harvested stems to effectively halt bleeding by directly applying to wounds. The use of *Amuk-bran/Tamyamtatshüy* (*Tinospora cordifolia*) was found to be practiced by three respondents, with two from Kaning village and one from Chipro village. All the respondents perceived this practice to be up to 100 per cent effective. Although most of the respondents were aware of this plant, they did not actively apply it. Due to its limited availability, only few individuals were able to correctly identify this plant, which restricts its widespread usage. These factors contribute to the lower adoption of the plant among users.

Nicotiana spp.

Nicotiana spp. belonging to family Solanaceae are herbaceous plants, which are used as local source of tobacco by the *Mishmi* tribe of Anjaw district. This wild tobacco plant is known locally as *Tumbyah/Duwã*. The freshly harvested leaves of *Tumbyah/Duwã* are briefly exposed to fire before being placed in the chicken nests, effectively acting as a natural flea repellent. Tobacco (*Nicotiana spp.*) is frequently mentioned in traditional medicine as a potent pesticide and possesses notable anti-parasitic properties (Uddin *et al.*, 2022). The use of *Tumbyah/Duwã* (*Nicotiana spp.*) as an insect repellent was reported by a single respondent from Hutong village. The practice was perceived as being up to 75.00 per cent effective by the respondent. It

was discovered that the effectiveness of this practice depends on the use of cured tobacco leaves, which helps control fleas to some extent. However, most of the respondents were not aware of such practice.

Stephania japonica

Stephania japonica belongs to family Menispermaceae is a herbaceous perennial vines with peltate and membranous leaves and a large underground tuber. *Stephania japonica* is known locally as *Chapukk/Chikãpum* among the *Mishmi* community of Anjaw district. Traditionally, the tubers of *Stephania japonica* are gathered and cut into smaller pieces, which are then scattered in proximity to the chicken nests or around the house. This practice effectively serves as a natural flea repellent as *S. japonica* is reported to possess antimicrobial and insecticidal properties (Verma, 2014). None of the respondents were found to practice the use of *Chapukk/Chikãpum* (*Stephania japonica*) as an insect repellent. The information about the use of this plant as insect repellent was reported from Manchal circle and Hawai circle. Most of the younger generations were unaware of such practice. Changes in the housing style of the *Mishmi* community may contribute to the plant's decreased applicability. In the past, chicken nests were placed within the house's front portion to protect them from animal attacks, creating a favourable environment for flea breeding. To control fleas, chopped *Chapukk/Chikãpum* was placed in the house. However, over time, the practice shifted, and chicken nests are now placed separately, greatly reducing the incidence of fleas inside the house. This change in housing style resulted in a decreased need for the plant's use and subsequently led to less awareness among others about its insecticidal properties.

Syzygium spp.

Syzygium spp. belongs to Myrtaceae family and is known locally as *chann* is a tree with dense bushy crown, with medium height and young leaves emerge as reddish in colour, which later changes to green. The leaves of *Syzygium* are harvested from their natural habitat, crushed, and subsequently applied to the affected area of the animal. On occasion, the leaves are also dispersed over the animal shed. This practice proves beneficial in the treatment of skin infections in pigs, aiding in the healing process. It is reported that Plants belonging to the genus *Syzygium* are being used in the traditional system of medicine in Asian countries like India, China and Bangladesh (Weber *et al.*, 2019). The use of *Chann* (*Syzygium spp.*) as a remedial for treatment of skin infection of pigs was reported by single respondent from Kamlat village. The perceived effectiveness for the practice was up to 100 per cent by the respondent. Most of the respondents were unaware about such practice as the knowledge was not passed on to others resulting in lack of awareness about such practices.

Ricinus communis

Ricinus communis, known as castor oil plant which belongs to the Euphorbiaceae family, is known locally as

Changkoh/Tyutha among the *Mishmi* community. Traditionally, during fever, leaves of *Ricinus communis* plant are placed near the chicken nest, and few leaves are crushed and mixed with feed to be fed to the chickens. This practice is believed to aid in the recovery of chicken health as reported that *Ricinus communis* leaves possess antiviral activity. The use of *Changkoh/Tyutha* (*Ricinus communis*) for fever treatment of chicken was reported to be practiced by single respondent from Kamlat village. The effectiveness perceived was up to 100 per cent by the user. Most of the respondents were unaware about such practice. The limited adoption of this practice could be due to the reason that people with knowledge about such practice did not transmit to others.

Coptisteeta

Coptis teeta, a stemless herbaceous plant belonging to the family Ranunculaceae, is popularly known as *Mishmi teeta*. This plant is a perennial herb with a rhizomatous growth habit and densely fibrous roots. It features long petioles and ovate-lanceolate leaves. It is also referred to as *Pawah/Ruchek* among the *Mishmi* community of Anjaw district. The roots of the *Coptis teeta* plant are placed in a bowl of water and left to soak for a few hours until the water changes to a yellowish color. This resulting solution is then used as eye drops for animals such as

mithuns to treat eye infections. The use of *Pawah/Ruchek* (*Coptisteeta*) as an eye drop was reported by a single respondent from Chipro village. The respondent perceived its effectiveness to be up to 100 per cent. However, other respondents were unaware of this particular practice, although they were familiar with the plant's other medicinal properties. Traditionally, *Pawah/Ruchek* has been used for various treatments in humans. The limited availability of *Pawah/Ruchek* during times of need may restrict its usage in this context.

Ethno-veterinary practices are essential components of traditional knowledge systems, effortlessly combining cultural wisdom with practical animal care. The importance of documentation of such Indigenous Knowledge lies in the fact that such knowledge is fast disappearing and it is imperative that before it becomes extinct it must be acknowledged and recorded as it is a valuable knowledge bank. The finding also shows that very few people had applied these practices because it has not been passed down to them or it has faded from memory. These methods, as demonstrated by numerous indigenous cultures, highlight the necessity of preserving and integrating traditional wisdom for holistic and long-term veterinarian care.

Table 1. Identified ethno-veterinary medicinal plants used by Mishmi tribe

Sl. No	Botanical name	Local name	Therapeutic uses	Plant parts used	Indigenous knowledge
1	<i>Zanthoxylum oxyphyllum</i> / Rutaceae	<i>Mazang/ Mathā</i>	Anti-ticks	Leaf and seeds	Small amount of crushed seed powder or one to two leaves are mixed with common salt and fed to animals like mithun.
2	<i>Gynocordia odorata</i> / Achariaceae	<i>Tahmah-shung /Lükap-ashang</i>	Anti-maggot	Bark	Barks are crushed and applied over the wounds.
3	<i>Datura stramonium</i> / Solanaceae	<i>Mokya/Bruphala</i>	Anti-maggot	Leaf	Leaves are crushed and applied over the wounds to kill the maggots.
4	<i>Prunus persica</i> / Rosaceae	<i>Aman-sit / Haqum-sik</i>	Anti-maggot	Leaf	Leaves are crushed and applied over the wounds to kill the maggots.
5	<i>Camellia sinensis</i> / Theaceae	<i>Phalap/Phalam</i>	cuts	Leaf	Fresh leaf is crushed and applied over fresh\ wound after castration for healing.
6	<i>Bambusa spp.</i> / Poaceae	<i>Wah-maiwall/ Hwü-takeh</i>	cuts	Bamboo skin	Using sharp object bamboo skin is peeled and powdered. This powder is applied over fresh cut to stop blood flow.
7	<i>Bryophyta</i>	<i>Maiwan/ Mepüng</i>	cuts	Whole plant	Mosses are collected and crushed. This is applied over wounds to stop bleeding.
8	<i>Tinospora cordifolia</i> / Menispermaceae	<i>Amuk-bran / Tamyamtatshüy</i>	cuts	Stem	Sap from freshly harvested stem is applied over fresh wound.
9	<i>Nicotiana spp.</i> / Solanaceae	<i>Tumbyah/ Duwā</i>	Insect repellent	Leaf	Fresh leaf is plucked and exposed to fire for few minutes. This leaf is placed near the chicken nest which act as repellent against the fleas.
10	<i>Stephania japonica</i> / Menispermaceae	<i>Chapukk/ Chikāpum</i>	Insect repellent	Tuber	Tuber is chopped and placed near the chicken nest. This act as repellent against the fleas.
11	<i>Ricinus communis</i> / Euphorbiaceae	<i>Changkoh/ Tyutha</i>	Fever	Leaf	During fever, leaves are placed near the chicken nest, and a few of them are crushed and fed to the chickens.
12	<i>Syzygium spp.</i> / Myrtaceae	<i>Chann</i>	Skin infection	Leaf	Leaf is crushed and applied over the infected skin or leaves are spread over the pig shed. This helps in healing the skin infection in pigs.
13	<i>Coptis teeta</i> / Ranunculaceae	<i>Pawah/ Ruchek</i>	Eye sore, infection	Root	The root extract is mixed with water and utilized as eye drops in animals such as mithun.

N=220

Table 2. Perceived effectiveness towards ethno-veterinary practices by the users

Sl. No.	Ethno-veterinary Practices	No. of users		Effectiveness						
		F	%	No success	Up to 25 %	Up to 50 %	Up to 75 %	Up to 100 %		
1	<i>Mazang/Mathā</i> as anti-tick	3	1.35							
2	<i>Tahmah-shung/Lūkāp-ashang</i> as anti-maggot	mil	mil							
3	<i>Mokya/Bruphala</i> as anti-maggot	1	0.45							
4	<i>Aman-sit/Haqum-sik</i> as anti-maggot	1	0.45							
5	<i>Phalap/Phalam</i> for healing cut wounds	mil	mil							
6	<i>Wah-maiwall/Hwū-Takeh</i> for healing cut wounds	mil	mil							
7	<i>Maiwan/Meping</i> for healing cut wounds	4	1.80							
8	<i>Amuk-bran/TamyamTatshūy</i> for healing cut wounds	3	1.35							
9	<i>Tumbyah/Duwā</i> as insect repellent	1	0.45							
10	<i>Chapukki/Chikāpum</i> as insect repellent	mil	mil							
11	<i>Changkoh/Tyutha</i> during fever	1	0.45							
12	<i>Chann</i> for skin treatment	1	0.45							
13	<i>Pawah/Ruchekas</i> eye drops	1	0.45							

Table 3. Perceived effectiveness score of ethno-veterinary practices

Sl. No.	Ethno-veterinary practices	No. of users		Perceived Effectiveness Score	Mean of Perceived Effectiveness Score
		F	%		
1	<i>Mazang/Mathā</i> as anti-tick	3	12	4.00 (M)	
2	<i>Tahmah-shung/Lūkāp-ashang</i> as anti-maggot	0	0	0.00 (N)	
3	<i>Mokya/Bruphala</i> as anti-maggot	1	4	4.00 (M)	
4	<i>Aman-sit/Haqum-sik</i> as anti-maggot	1	4	4.00 (M)	
5	<i>Phalap/Phalam</i> for healing cut wounds	0	0	0.00 (N)	
6	<i>Wah-maiwall/Hwū-Takeh</i> for healing cut wounds	0	0	0.00 (N)	
7	<i>Maiwan/Meping</i> for healing cut wounds	4	9	2.25 (L)	
8	<i>Amuk-bran/TamyamTatshūy</i> for healing cut wounds	3	12	4.00 (M)	
9	<i>Tumbyah/Duwā</i> as insect repellent	1	3	3.00 (L)	
10	<i>Chapukki/Chikāpum</i> as insect repellent	0	0	0.00 (N)	
11	<i>Changkoh/Tyutha</i> during fever	1	4	4.00 (M)	
12	<i>Chann</i> for skin treatment	1	4	4.00 (M)	
13	<i>Pawah/Ruchekas</i> eye drops	1	4	4.00 (M)	

H = Highly Effective, M = Moderately Effective, L = Less Effective, N = Nil



(1) *Mazang/Mathā*



(2) *Tahmah-shung/Lükap-ashang*



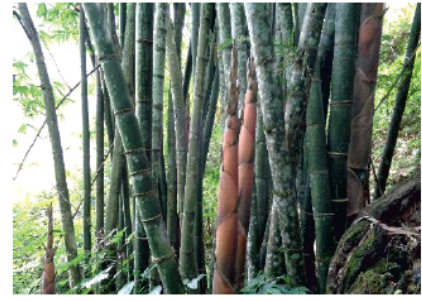
(3) *Mokya/Bruphala*



(4) *Aman-sit/Haqum-sik*



(5) *Phalap/Phalam*



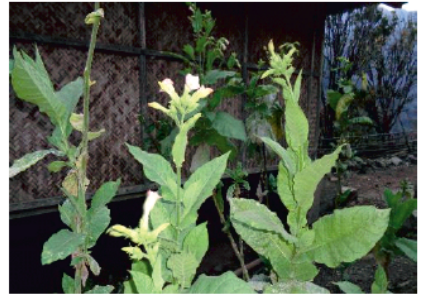
(6) *Wah/Hwü*



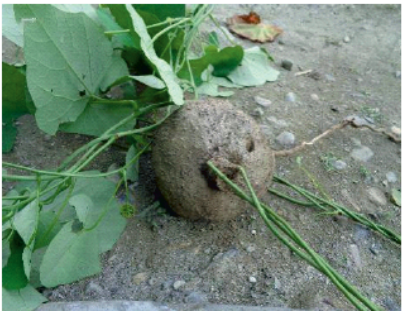
(7) *Maiwan/Mepüing*



(8) *Amuk-bran/Tamyam Tatshüy*



(9) *Tumbyah/Duwā*



(10) *Chapukk/Chikāpum*



(11) *Changkoh/Tyu Tha*



(12) *Chann*



(13) *Pawah/Ruchek*

Plate 1. Identified ethno-veterinary medicinal plants

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