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Research Article

ETHNOVETERINARY PRACTICES OF PACODE VILLAGE, KANYAKUMARI DISTRICT, TAMILNADU, INDIA

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Abstract

Medicinal plants are treating and preventing various diseases. Kanyakumari district of India is well known for its wealth of natural vegetation. Ethnomedicinal studies in this district have been carried out by various researchers. However, there is not much information available on ethnoveterinary medicine in the Pacode village of Kanyakumari district, Tamilnadu. The aim of this study was to examine the potential use of folk plants as alternative medicine for cattle to cure various diseases in the Pacode village. Ethnobotanical data were collected from November 2016 to April 2017 mainly using semi-structured interviews with informants and through field observations. The collected data were analyzed through UV, FL (%) and ICF. The study revealed the use of 37 medicinal plant species in the villagers for the treatment of several livestock diseases, representing 36 genera and 24 families. Ophthalmic disease is the disease group in the study area that scored the highest Informant consensus factor (ICF) value (1.00), followed by Dental care (0.93). Our study provided evidence that medicinal plants are still playing important role in the management of livestock diseases in and showed that ethnoveterinary plants used in animal health care in Pacode village, Kanyakumari district, Tamilnadu.

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1. Introduction

Ethnoveterinary is the branch of ethnobotany deals with the study of relationship between plants and animals. Ethnoveterinary medicine also deals with people's knowledge, skills, methods, practices and beliefs about the care of their animals (McCorkle, 1986). Ethnoveterinary practices are the practices of indigenous people followed in animal healthcare.

It is operationalzed as the knowledge and practices of local people with regard to the treatment of minor ailments or health problems or diseases in different species of livestock using different locally available materials. Traditional medicines are not only cost effective but are socially compatible and easily available (Das and Tripathi, 2009). Modern medicines and ethnoveterinary practices can therefore complement each other to come up with the vast strategies for climate change mitigation and adaptation (Adugna, 1996). The traditional knowledge of the villagers are in verge of extinction. So, there is an urgent need to document the medicinal plant knowledge. Due to these reasons an attempt has been made to document the medicinal plants used in the traditional system of

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medicine in Pacode village of Kanyakumari district.

2. Materials and Methods

Study area

The area under study, Pacode village is located in Kanyakumari district of Tamilnadu. The district lies between 77º 05′and 77º 36′ eastern longitudes and 8º 35′ and 8º 35′ northern latitudes. The climate of the district is warm and humid with no cold season. The summer season is particularly oppressive. Unlike other district in Tamilnadu, Kanyakumari district has a unique advantage of rainfall both during the south- west and north- east monsoons.

Ethnobotanical survey

An ethnobotanical survey was conducted among the Pacode village people of Kanyakumari district of Tamilnadu. Intensive field surveys were conducted during the period of 2016 November to 2017 April. A total of 50 informants (25 males and 25 females), ranging from 20 to 75 years old and including farmers, shepherds, housewives and herbalists familiar with livestock problems were interviewed and their responses recorded in detail. The interviews were conducted in the local language Tamil. The methodology as proposed by Jain (2000) was followed. Ethnobotanical survey conducted among the village of to gather information about the medicinal uses of plants, which cure many livestock diseases like diarrhea, dysentery, fever, udder swelling in cattle etc. Ethnoveterinary data on medicinal plants used by the villagers was entered in an excel spreadsheet and organized for statistical analysis. Descriptive statistics was applied to compute the number and percentage of species, genera and families of medicinal plants. Plant parts used, mode of remedy preparation and route of administration were recorded. Some of the plants were identified from the field itself. Medicinal plants were photographed. Plant specimens were collected, prepared herbariums. Taxonomic identification of the collected plant samples was carried out with the help of Floras (Gamble and Fischer, 1956; Nair and Henry, 1983). Plant names have been checked and updated with the online website of the Royal Botanic Gardens, Kew (The Plant List, 2013). Herbarium specimens were deposited in the Department of Botany, Scott Christian College, Nagercoil.

Quantitative data analysis

The ethnomedical data recorded in the study was analyzed quantitatively. The quantitative techniques used in the present work are Use Value (UV), Informant Consensus Factor (F_{ic}) and Fidelity Level (FL).

Ailment categories

Based on the formation obtained from the study area, all the reported livestock ailments were categorized into nine categories *viz*., Dermatological ailment, Respiratory ailments, Genito urinary ailments, Gastro intestinal ailment, Skeletomuscular ailments, Ophthalmic disease, General health, Reproductive ailments and Dental care.

Use value

Use value indicates the species that are considered most important by a given population. It is calculated using the formula

$$UV = \sum U/n$$

Where U is the use reports mentioned by the informant, n is the total number of informants. Use value ranges from 0 to 1 (Philips *et al*., 1993).

Informant consensus factor

The informant consensus factor was used to analyze the homogeneity and agreement degree of the informant's medicinal knowledge about each category. This was calculated by the formula

$$F_{ic} = (N_{ur} – N_t) / (N_{ur} –1)$$

Where N_{ur} is the number of use reports in particular ailment category and N_t is the number of taxa used for a particular ailment category (Heinrich *et al*., 1998).

Fidelity level

Fidelity level (FL) is the ratio between the number who mentioned the use of a plant for particular purpose and the total number of informants who mentioned the use of the plant for

any purpose. FL can be calculated using the formula

$$FL\ (\%) = N_p/N \times 100$$

Where, N_p is the number of use reports cited for a given species for a particular ailment and N is the total number of use reports of the plant species. FL is obtained for plants that are used for many different purposes (Friedmen *et al*., 1986).

3. Results

Ethnobotanical information gathered showed a diversity of native plants with medicinal utility. The present investigation comprises 37 taxa used by the villagers as ethnoveterinary. The ethnomedicinal plants distributed in 36 genera belonging to 24 families (Table - 1). Out of the documented medicinal plants, 13 genera belong to the polypetalae, 5 belong to the gamopetalae, 2 belong to the monochlamydeae and 4 belong to the monocotyledons. For each species, botanical names, local names, family, habit, part used, method of preparation, and ailments treated are provided.

Habit of medicinal plants

In the present study, habit wise distribution of ethnoveterinary medicinal plants showed the herbs were mainly used in medicine. Herbs 17 species (46 %) were found to be the most used plants (Figure - 1) followed by shrubs 8 species (21 %), trees 8 species (22 %) and climbers 4 species (11 %) in descending order.

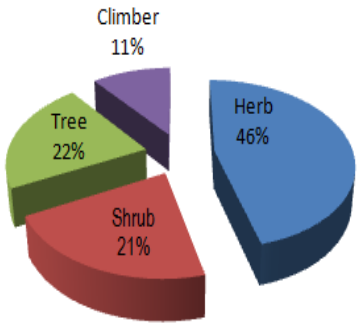

Figure – 1: Habitwise distribution of ethnoveterinary medicinal plants of the study area

Family wise distribution of the medicinal plants shows that Zingiberaceae was the dominant family with 4 taxa, the co-dominant position was occupied by Leguminosae, Poaceae each with 3 taxa. Acanthaceae, Asteraceae, Arecaceae, Caricaceae, Meliaceae, Menispermaceae, Moringaceae, Musaceae, Myrtaceae, Piperaceae, Portulaceae, Rutaceae, Sapindaceae, Verbenaceae and Vitaceae were monospecific (Table - 1).

Table - 1: Family wise distribution of medicinal plants

S. No	Family	Genus	Species
1	Acanthaceae	2	2
2	Anacardiaceae	1	1
3	Annonaceae	1	1
4	Apiaceae	1	1
5	Arecaceae	2	2
6	Asteraceae	2	2
7	Caricaceae	1	1
8	Euphorbiaceae	2	2
9	Lamiaceae	2	2
10	Leguminosae	3	3
11	Meliaceae	1	1
12	Menispermaceae	1	1
13	Moringaceae	1	1
14	Musaceae	1	1
15	Myrtaceae	1	1
16	Piperaceae	1	1
17	Poaceae	3	3
18	Portulaceae	1	1
19	Rutaceae	1	1
20	Sapindaceae	1	1
21	Solanaceae	1	2
22	Verbenaceae	1	1
23	Vitaceae	1	1
24	Zingiberaceae	4	4
Total		**36**	**37**

Plant parts used in the medicine preparation

In the present study, the various plant parts used as medicines were leaves (19 taxa), whole plant (6 taxa), Bark (3 taxa), fruits (2 taxa), flowers (1 taxa), Rhizome (3 taxa), stem (1 taxa) and seed (2 taxa). The leaves are the predominant part utilized in the treatment of veterinary diseases.

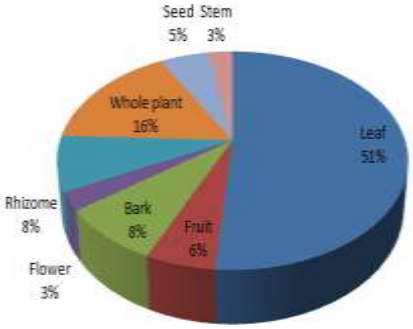

Figure – 2: Plant parts used in ethnoveterinary medicinal preparation by the villagers

Mode of preparation

Decoction, paste, powder, infusion, oil, juice and raw are the common methods employed for the preparation of medicinal plants. Among these majority of the plant remedies were prepared by paste (46 %) followed by juice (23 %), raw (21 %), decoction (11 %), oil (8 %) and infusion (3%).

Figure – 3: Mode of preparation of ethnomedicine

Mode of Application

Plant medicine was mostly administrated to the livestock in the oral form (28 taxa; 76 %), followed by topical application (9 taxa; 24%) (Figure - 4).

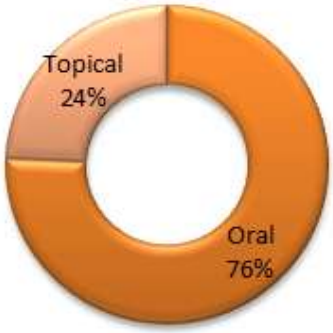

Figure – 4: Mode of application of herbal preparations by the informants

Quantitative analysis of data

Use value

The most commonly used species was *Mangifera indica* L. with 28 use reports, giving the highest use value of 0. 56 *Mangifera indica* is attributed to its use in the treatment of various diseases and it is well recognized all the informants to treat dysentery. *Carica papaya* with 25 use reports giving the use vale of 0.50 used by the rural people for treating dysentery in fowls. *Psidium guajava* with 19 use reports used for treating Diarrhoea. *Justiciaa dhathoda* with 19 use reports used for treating leg pain in cow each with 0.38 use value. *Plectranthus amboinicus* (Lour.) Spreng with 15 use reports with the use value of 0.30 used for the treatment of mouth ulcer, *Centella asiatica* with 18 use reports for treating sickness in chicken with 0.36 use value. *Ricinus communis* having 12 use reports with the use vale of 0.24 used for the treatment of constipation, *Tamarindus indica* having 11 use reports with the use value of 0.22 used for the treatment of stomach pain. *Solanum melongena* and *Solanum surattense* each with 8 use reports having the use value of 0.16. The very low use value *Acalypha indica*, *Acorus calamus*, *Alpinia galanga*, *Bambusa bambos*, *Saccharum spontaneum*, *Talinum fruticosum* and *Tridax procumbens* (one use reports with a UV of 0.02)

Table - 2: Ethnoveterinary medicinal plants used by the villagers of Pacode, Kanyakumari district

Binomial	Local name	Family	Parts used	Habit	Mode of Preparation	Disease it cures	Mode of application	Use value
Acalypha indica L.	Kuppaimeni	Euphorbiaceae	Leaf	Herb	Paste	Bronchitis, Cough	Topical	0.02
Acorus calamus L.	Vasambu	Zingiberaceae	Leaf	Herb	Paste	Mastitis	Topical	0.02
Alpinia galangal (L.) willd	Kolingi	Zingiberaceae	Rhizome	Herb	Juice	Diarrhea	Oral	0.02
Annona squamosa L.	Munthiri	Annonaceae	Leaf	Tree	Paste	Mastitis	Topical	0.06
Azadirachta indica A. Juss.	Vaepilai	Meliaceae	Leaf	Tree	Oil	Leg pain	Topical	0.04
Bambusa bambos (L.) Voss	Muzhailai	Poaceae	Leaf	Tree	Raw	Diarrhoea	Oral	0.02
Borassus flabellifer L.	Panai	Arecaceae	Fruit	Tree	Paste	Skin itching	Topical	0.06
Cardiospermumhalicacabum L.	Mudakathankeerai	Sapindaceae	Whole plant	Climber	Paste	Face inflammation	Oral	0.14
Carica papaya L.	Papali	Caricaceae	Leaf	Tree	Raw	Dysentery	Oral	0.5
Cassia fistula L.	Konnai	Leguminosae	Bark	Shrub	Paste	Conjunctivitis	Oral	0.16
Centella asiatica (L.) Urb.	Vallarai	Apiaceae	Whole plant	Herb	Paste	Poultry disease/ Urination problems	Oral	0.36
Cissampelos pareira L.	Malaithangipachilai	Menispermaceae	Leaf	Climber	Paste	Discharge from udder	Oral	0.14
Cissus quadrangularis L.	Pirandai	Vitaceae	Stem	Climber	Raw	Placental expulsion	Oral	0.14
Clitoria ternatea L	Changupushpam	Leguminosae	Leaves	Herb	Juice	Lice removal	Topical	0.06
Cocos nucifera L.	Thennai	Arecaceae	Flower	Tree	Decoction	Reducing body heat	Oral	0.01
Curcuma longa L.	Manjal	Zingiberaceae	Rhizome	Herb	Paste	Dysentry	Oral	0.04
Cynodon dactylon (L.) Pers.	Aruhampul	Poaceae	Leaf	Herb	Raw	Dysentry	Oral	0.14
Helianthus annuus L.	Suriyakanthi	Asteraceae	Seed	Shrub	Oil	Easy delivery	Oral	0.04
Justicia adhathoda L.	Adathoda	Acanthaceae	Whole plant	Shrub	Decoction	Leg pain	Topical	0.38
Leucas aspera (Willd.) Link	Thumbai	Lamiaceae	Leaf	Herb	Paste	Fever	Oral	0.14
Mangifera indica L.	Mamaram	Anacardiaceae	Bark	Tree	Infusion	Diarrhoea	Oral	0.56
Moringa oleifera Lam.	Murangaikeerai	Moringaceae	Leaf	Shrub	Paste	Mastitis	Topical	0.06
Murraya koenigii (L.) Spreng.	Karivepilai	Rutaceae	Leaf	Shrub	Paste	Stomach inflammation	Oral	0.18
Musa paradisiaca L.	Vazhai	Musaceae	Leaf	Herb	Raw	Prevental disease during summer sesason	Oral	0.12
Piper nigrum L.	Nalamilaghu	Piperaceae	Leaf	Climber	Raw	Stomach inflammation	Oral	0.1
Plectranthus amboinicus (Lour.) Spreng.	Navrapachalai	Lamiaceae	Leaves	Herb	Paste	Mouth ulcer	Oral	0.3
Psidium guajava L.	Koiya	Myrtaceae	Bark	Shrub	Juice	Diarrhoea	Oral	0.38
Rhinacanthus nasutus (L.) Kurz	Nagamalli	Acanthaceae	Whole plant	Herb	Juice	Diarrhoea	Oral	0.08
Ricinus communis L.	Amanakku	Euphorbiaceae	Seed	Shrub	Oil	Constipation	Oral	0.24
Saccharum spontaneum L.	Pekkarimpu	Poaceae	Whole plant	Herb	Raw	Heat production	Oral	0.02
Solanum melongena L.	Katharikai	Solanace	Fruit	Herb	Paste	Enchance matting	Oral	0.16

Solanum surattense Burm. f.	Kandakathr ari	Solanacea e	Whole plant	Herb	Decoction	Cough and cold	Oral	0.16
Talinum fruticosum (L.) Juss.	ParupuKeer ai	Portulacea e	Leaf	Herb	Decoction	Face inflammation	Oral	0. 02
Tamarindus indica L.	Puliyamara m	Legumino sae	Leaf & Pod	Tree	Raw	Stomach pain	Oral	0.22
Tridax procumbens (L.) L.	MuriamPac hilai	Asteracea e	Leaf	Herb	Paste	Sores	Topical	0.02
Vitex negundo L.	Notchi	Verbenac eae	Leaf	Shru b	Paste	Breathing difficulty	Oral	0.08
Zingiber officinale Roscoe	Ingi	Zingibera ceae	Rhizo me	Herb	Paste	Constipation	Oral	0.12

Table – 3: ICF value of the ethnoveterinary disease categories

S. No	Ailment category	Number of use - reports (Nur)	Number of taxa (Nt)	ICF
1	Dermatological ailment	7	3	0.66
2	Respiratory ailments	13	3	0.83
3	Genito urinary ailments	28	5	0.85
4	Gastro intestinal ailments	108	13	0.88
5	Skeletomuscular ailments	13	2	0.91
6	Opthalmic disease	7	1	1
7	General health	44	5	0.9
8	Reproductive ailments	16	3	0.86
9	Dental care ailments	17	2	0.93

Informant consensus factor

The Informant consensus factor (ICF) 9 ailments were shown in Table - 3. The ICF value for different disease categories ranges from 0.66 to 1 which indicates the greater agreement among the informants regarding the uses of medicinal plants for treating different ailments. The ailment categories having the highest level of Informant Consensus Factor (ICF = 1.00) obtained for Opthalmic disease. The Genitourinary ailment category showing the Informant Consensus Factor (ICF = 0.85).The lowest Informant Consensus Factor (ICF = 0.66) obtained for Dermatological ailment category, Gastro intestinal ailment category showing the Informant Consensus Factor (ICF=0.88). Respiratory ailments showing Informant Consensus Factor (ICF = 0.83), Reproductive ailments category showing Informant Consensus Factor (ICF = 0.86), Dental care ailments category showing Informant Consensus Factor (ICF = 0.93), Skeletomuscular ailments category showing Informant Consensus Factor (ICF = 0.91), General health ailments category showing Informant Consensus Factor (ICF = 0.90).

Fidelity level

In the present study, 35 taxa were recorded with 100 % fidelity level for different ailment category *Borassus flabellifer*, *Clitoria ternatea*, *Tridax procumbens*, *Acalypha indica*, *Solanum surattense*, *Vitex negundo*, *Acorus calamus*, *Annona squamosa*, *Moringa oleifera*, *Cissampelos pareira*, *Alpinia galanga*, *Rhinacanthus nasutus*, *Mangifera indica*, *Psidium guajava*, *Bambusa bambos*, *Zingiber officinale*, *Piper nigrum*, *Cynodon dactylon*, *Carica papaya*, *Murraya koenigii*, *Ricinus communis*, *Talinum fruticosum*, *Tamarindus indica*, *Azadirachta indica*, *Cardiospermum halicacabum*, *Cassia fistula*, *Cocos nucifera*, *Leucas aspera*, *Musa paradisiaca*, *Saccharum spontaneum*, *Cissus quadrangularis*, *Solanum melongena*, *Helianthus annuus*, *Plectranthus amboinicus* and *Centella asiatica* with 0.55 %

Table – 4: Fidelity level of the most preferred taxa treating specific ailment

Ailment category	Specific ailment	Most preferred taxa	FL% = Np/N*100
Dermatological ailment	Skin itching	*Borassus flabellifer* L.	100
	Lice removal	*Clitoria ternatea* L	100
	Sores	*Tridax procumbens*(L.) L.	100
Respiratory ailments	Bronchitis, Cough	*Acalypha indica* L.	100
	Cough and cold	*Solanum surattense* Burm. f.	100
	Breathing difficulty	*Vitex negundo* L.	100
Genitourinary ailments	Mastitis	*Acorus calamus* L.	100
		Annona squamosa L.	100
		Moringa oleifera Lam.	100
	Urination problems	*Centella asiatica* (L.) Urb.	55.5556
	Discharge from udder	*Cissampelos pareira* L.	100
Gastrointestinal ailment	Diarrhea	*Alpinia galangal* (L.) Willd	100
		Rhinacanthus nasutus (L.) Kurz	100
		Mangifera indica L.	100
		Psidium guajava L.	100
		Bambusa bambos (L.) Voss	100
		Zingiber officinale Roscoe	100
		Piper nigrum L.	100
	Dysentry	*Curcuma longa* L.	100
		Cynodon dactylon (L.) Pers.	100
		Carica papaya L.	100
	Stomach inflammation	*Murraya koenigii* (L.) Spreng.	100
	Constipation	*Ricinus communis* L.	100
	Stomach pain	*Talinum fruticosum* (L.) Juss.	100
Skeletomuscular ailments	Leg pain	*Tamarindus indica* L.	100
	Face inflammation	*Azadirachta indica* A. Juss.	100
Ophthalmic disease	Conjunctivitis	*Cardiospermum halicacabum* L.	100
General health	Poultry disease	*Cassia fistula* L.	100
	Reducing body heat	*Centella asiatica* (L.) Urb.	44.4
	Fever	*Cocos nucifera* L.	100
	Prevent disease during summer season	*Leucas aspera* (Willd.) Link	100
	Heat production	*Musa paradisiaca* L.	100
Reproductive ailments	Placental expulsion	*Saccharum spontaneum* L.	100
	Enhance matting	*Cissus quadrangularis* L.	100
	Easy delivery	*Solanum melongena* L.	100
Dental care ailments	Mouth ulcer	*Helianthus annuus* L.	100
		Plectranthus amboinicus (Lour.) Spreng.	100

4. Discussion

India is rich in its medicinal diversity with many different cultures have retained traditional knowledge concerning the medicinal utility of the native flora. In the present investigation, a total of 37 medicinal plants belonging to 36 genera from 24 families were collected and recorded. Plants were able to cure different nine livestock ailments such as cough, stomach inflammation, stomach inflammation, placental expulsion, constipation, dysentery, diarrhea, leg pain, eye diseases, fever etc. affecting livestock. In the present study, medicines mainly prepared by grinding the plant material in the paste form. Similarly Saha *et al*. (2014) reported that paste can often be found as one of the major forms of drug preparation in ethnoveterinary practices as it is easy to prepare by pestle and mortar with or without water. Plant parts used by the rural people to treat various ailments were mainly leaves followed by whole plant, fruits, bark and seeds. Same was reported by Parthipan *et al*. (2016). Aerial parts of plant and whole plants were also used in case of small herbaceous plants. The reason why leaves were used mostly is that they are collected very easily than underground parts flowers and fruits etc. (Giday *et al*., 2009). UV is high when there are many use-reports for a plant, and low value when there are few use reports (Philips *et al*., 1993). In the present study, High Informant Consensus Factor (1) noticed for Ophthalmic disease. Medicinal plants used to treat livestock diseases from Kudavasal taluk of Thiruvarur district Urological ailments and Psychological ailments with High Informant Consensus Factor of 1 (Parthipan *et al*., 2016). High F_{ic} values (1.00) are obtained when only one or a few plant species are reported to be used by a high proportion of informants for a particular category. Whereas low F_{ic} values indicate that informants disagree over which plant to use (Heinrich *et al*., 1998). High level of consensus regarding ethnoveterinary knowledge which was consistently associated with the common people culture in the area (Mandal and Rahaman, 2014). In the present study, 35 taxa were recorded with 100 % fidelity level for different ailment category. High FL (100 %) is obtained for plants for which almost all use mentions refer to the same purpose (Friedmen *et al*., 1986). In the present study, whole plant paste of *Cissus quadrangularis* given orally to cattle for the expulsion of placenta. Same reported by Kiruba *et al*. (2006). Most of the reported plants in the present study are also used by the different types of people in India for the treatment of various diseases in livestock (Girach *et al*.,1998; Reddy *et al*., 2006; Mini and Sivadasan, 2007; Harsha *et al*., 2005; Satya and Solanki, 2009; Yadav, 2009; Rahman *et al*., 2009). Traditional veterinary practices reported from Dindigul district (Rajan and Sethuraman, 1997) and some southern districts of Tamilnadu (Ganesan *et al*., 2008) showed some resemblance with the present study but most of the uses found to be different.

5. Conclusion

Animals and plants are integral to part of their culture, religion. It was clearly observed that the knowledge regarding ethno veterinary medicine is still surviving among the elderly members of the rural communities in the district Kanyakumari. The traditional knowledge of local plants of ethno veterinary values is mainly possessed by elder family members and transmitted from generation to generation. Present study also observed that some of healers uproot the whole plant and virtually throw them out after collecting the required portion of the plant parts like roots, rhizomes, etc. This is causing a great deal of erosion of medicinal plants from the study area. Thus increasing demand of medicinal plants and their improper uses may result in disappearance of important plant species in near future. Therefore, the need of hour is to cultivate the medicinal plants along with their conservation, proper documentation and phytochemical investigation. This is very much required for the sustainability of the ethnoveterinary practices of this region.

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