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ETHOVETERINARY STUDY ON PLANT RESOURCE UTILIZATION BY THE GADDI TRIBE OF BHADERWAH VALLEY, UNION TERRITORY OF JAMMU AND KASHMIR

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ABSTRACT

An extensive field survey was carried out in five randomly selected villages inhabited by the Gaddi tribe in Bhaderwah valley, UT of Jammu and Kashmir to document the ethnoveterinary plants used by Gaddi tribe for treatment of different diseases of their livestock. The settlements of Gaddi tribe in the study area are found in close proximity of Himalayan forests which are rich repository of medicinal plants. A total of 22 ethnoveterinary plant species belonging to 21 genera and 16 families were reported in the present study. As many as 21 cattle diseases were reported to be treated by using ethnoveterinary plants. Roots were the most used plant part and oral mode was the most common mode of drug administration. The rich traditional knowledge confined to the Gaddi tribes needs to be conserved before it is lost and the present study is an attempt in this direction.

KEYWORDS: *Foot and mouth disease, Himalayas, medicinal plants, traditional knowledge.*

INTRODUCTION

The interaction between humans, plants, and animals has existed since time immemorial when humans discovered natural resources to meet their requirements, including treatments for various personal ailments as well as for those of their livestock (Balick, 2020). The World Health Organisation estimates that almost 80% of people in underdeveloped nations rely on traditional practices for the prevention, diagnosis, and treatment of illnesses that impact humans and animals (Balaji & Chakravarthi 2010; Dutta et al. 2022). The focus of ethno veterinary medicine is on traditional veterinary care for animals and incorporates the knowledge, techniques, skills, beliefs, and practices of cultures (Sharma et al. 2012). Rural communities are more inclined towards plant based traditional healing practices because of its safety, efficacy, and affordability (Singh et al. 2022). The absence of adequate allopathic conventional health care systems forces remote communities throughout the world to rely on traditional medicines for their primary health care (WHO, 2002) and veterinary care (Schillhorn van Veen, 1997). Indian Himalayas are inhabited by many nomadic tribes and pastoral communities who have livestock rearing as a major source of livelihood and income (Sharma and Singh, 1989; Rashid, 2007; Sultan et al, 2022). Maintenance of livestock health in this region has been possible because of some traditionally proven ethnoveterinary practices. The *Gaddi* tribe is a partially settled tribe in the temperate regions of North-West Himalayas, where 1–2 family members or 8–10 people from one village adopt a nomadic lifestyle and move with their livestock i.e. sheep and goat flocks (Dutt *et al*., 2015). They depend solely on traditional medicine and herbal remedies for treating livestock diseases. However, this traditional knowledge is under continuous threat of extinction because of lack of interest of younger generation towards traditional practices, modernizations, death of elderly members and migration of communities from rural to urban area (Kala *et al.* 2006: Bhatia *et al.* 2014, Dutta et al., 2021). Considering the socio-economic importance of livestock rearing in this region, fast declining of traditional knowledge, significant research gap and to cover the unexplored areas, the present study was conducted to document the traditional ethnovetinary knowledge of Gaddi tribe of Bhaderwah valley.

MATERIAL AND METHODS

Study area.

Bhaderwah is a picturesque valley located in Himalayan regions within the Union Territory of Jammu and Kashmir, about 220 kilometers from Jammu city. Surrounded by lush evergreen forests and snow-clad peaks, Bhaderwah is one of the famous tourist spots that attract visitors, especially in the summer season. A small water stream viz. Neeru flows through this valley. Geographically, Bhaderwah borders Chamba district of Himachal Pradesh to the southeast, Kathua district to the south, Udhampur district to the west. The elevation of this mountainous valley varies widely from about 5,290 feet to 14,500 feet asl. It lies at 32°58′ N latitude and 75°42′ E longitude. The

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temperatures during summers remains moderate, ranging between 26°C and 29°C. Winters are harsh, with temperatures dropping to minus degrees and the area remains covered with snow.

Date Collection

In the present study five villages viz. Dhamunda, Dandi, Kansar, Haddal and Butla inhabited by the Gaddi tribe were randomly selected from the study area for collection of ethnoveterinary data. Several field visits were carried out between March 2024 and April 2025 to the selected villages in order to collect primary data from local informants. The information was gathered in the informants' mother language, the Gadyali language, through direct interviews and group discussions, and recorded using a semi-structured interview schedule. Plants of ethnoveterinary importance were identified by their local names by the informants and plant specimens were collected from their habitats. Photographs of the collected plant species were also taken to facilitate their proper botanical identification. Herbarium sheets were prepared following standard method, subsequently deposited in the herbarium of the University of Jammu and accession number was obtained for each plant species. Plants were scientifically identified with the help of local floras and taxonomic experts from the University of Jammu.

RESULTS AND DISCUSSION

Diversity and habitat of the ethnoveterinary plants

The present study recorded 22 plant species belonging to 21 genera and 16 families. The largest number of plant species belonged to the family Polygonaceae (4 spp.) followed by Pinaceae, Convolvulaceae and Rosaceae (2 spp. each). Herbs were the most used life-forms with 68.2% contribution followed by trees (22.8%). The shrubs and ferns were represented by 4.5% each. A number of other workers (Bhatia et al., 2014; Kumar et al., 2015; Lulekalet al., 2013; Maleki & Akhani, 2018) have also reported the dominance of herbs in the medicinal floras of their respective study areas. Dominance of herbs in ethnoveterinary practices can be attributed to their readily availability and high content of therapeutic compounds.

Most of the ethnoveterinary plants were found growing in temperate habitat whereas a few plants viz. *Aconitum ferox, Oxyria digyna* and *Rhododendron arboreum* were collected from higher elevations near tree line and from alpine zone.

Plant part used, mode of preparation and administration

Nine different plant-parts were used by Gaddi tribe of the study area for treatment of various cattle ailments (Fig. 1). Roots (30.5%) were the most used plant-part followed by leaves (17.4%), flowers (13.1%), rhizome, aerial parts, wood oil (8.7% each), branches, seeds and bark (4.3% each).

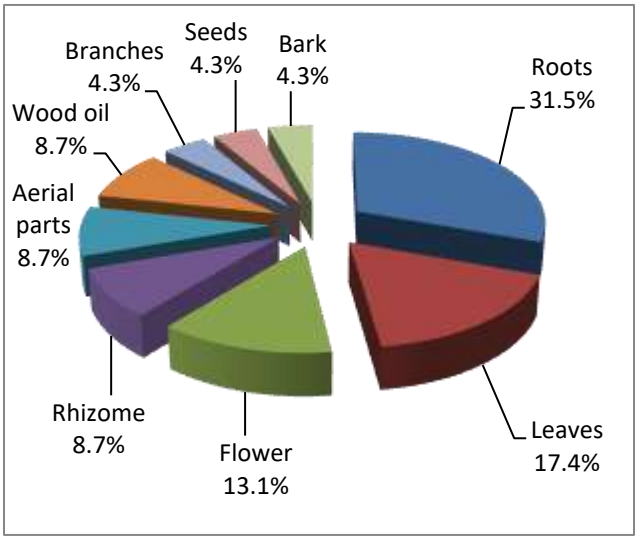

Fig. 1

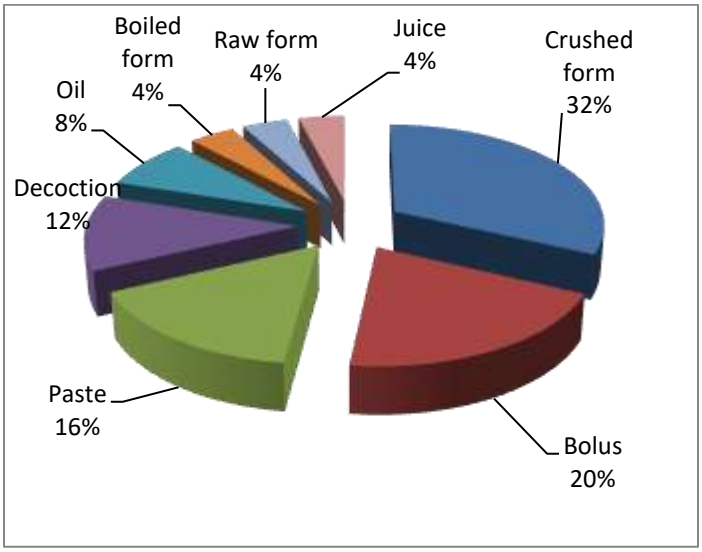

Fig. 2

Fig 1. Different plant parts used in ethnoveterinary drug preparation.
Fig 2. Different dosage forms used in ethnoveterinary practices.

Eight types of dosage forms were used and these were crushed form (32%), bolus (20%) paste (16%), decoction (12%), oil (8%), boiled form, raw form and juice (4% each) (Fig. 2). Crushed form has been reported to be the most commonly used dosage form. However, Revathi and Parimelazhagan (2010) have recorded paste (44%) as the most common mode of administration in Hasanur hills of Tamil

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Nadu. However, in some other studies decoction is the most prevalent method of medicine usage because it has high concentration of phenols, flavonoids and other nutraceuticals (Bhatia et al., 2014).

Out of 22 reported ethnoveterinary plants, 4 plant species viz. *Acorus calamus, Angelica glauca, Gerardinia diversifolia* and *Cedrus deodara* were used in combination with another species. Multi-species ethnoveterinary preparations offer many advantages. Usage of more than one species in medicinal preparations increases the activity of the medicine (Bhatia et al., 2014).

Remedy for a total of 21 diseases was suggested by the informants, which were grouped into 12 ailment categories for the convenience of study (Table 1). These diseases include dysentery, colic pain, pneumonia, cough, joint pain, mange, hematuria, foot and mouth disease etc.

Table 1. Different ethnoveterinary diseases treated by Gaddi tribe.

S. No	Disease category	Diseases included
1	Digestive problems	Intestinal worm infection, loss of appetite, dysentery, colic pain, flatulence, loose motions
2	Respiratory/pulmonary diseases	Lung infection, pneumonia, cough
3	Musculoskeletal problems	Arthritis, joint pain, fractures,
4	Skin problems	Mange,
5	Urinary problems	Hematuria,
6	Pregnancy and calving	Retained placenta,
7	Eye problems	Cataract, weak eyesight
8	General problems	Foot and mouth disease, Hypogalactia, wound healing, fever

Table 2. Ethnoveterinary uses of plants used by the Gaddi tribe.

S. No	Plant spsecies/Family/ Accession No.	Vernacular name	Family	Herbarium accession No.	Habit	Plant part used	Ailment Category	Mode of drug preparation and application route
1	*Aconitum ferox* Wall. ex Ser.	Bish	Ranunculaceae	JUH-16846	Herb	Roots	Digestive problems	Small quantity of roots are Crushed form, mixed with salt and administered orally to goats and sheep for intestinal deworming and as appetiser.
							Respiratory/ pulmonary problems.	The above formulation is administered orally to goats and sheep against lung infection.
2	*Acorus calamus* L.	Baryan	Acoraceae	JUH-16747	Herb	Roots	Musculoskeletal problems	Roots are Crushed form, mixed with maize dough and salt and given as a dose to cows and bulls as a treatment of arthritis, locally known as granu, a disease with joint pain symptoms*.
							General	Roots of *Acorus calamus* are Crushed form together with roots of *Angelica glauca* and the paste thus formed is mixed with salt and given orally to cows as galactagogue for increasing milk yield*.
							Digestive problems	Crushed form roots are mixed with maize dough and given orally to cattle in case of dysentry.

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3	*Angelica glauca* Edgew.	Chora	Apiaceae	JUH-16757	Herb	Roots	Digestive problems	Roots are Crushed form, mixed with maize dough and salt and given orally to cows, bulls, buffaloes, goats and sheep as a dose for treatment of indigestion, colic pain and flatulence.
							Respiratoty/ pulmonary problems	The above formulation is also given in case of pneumonia, locally known as *taaku**.
4	*Arisaema jacquemontii* Blume.	Keeda-ri-kukdi	Araceae		Herb	Rhizome	Respiratoty/ pulmonary problems	Rhizome is Crushed form, mixed with maize dough and salt and then given orally to cows, bulls, buffaloes, goats and sheep as a dose for treatment of pneumonia, locally known as taaku*.
5	*Cedrus deodara* (Roxb. ex D.Don) G.Don.	Gaid	Pinaceae	JUH-16884	Tree	Wood oil	Digestive problems	Wood oil is admisitered orally to goats and sheep for deworming, improving digestion and as an appetiser.
							Skin problems	Wood oil is applied topically as a treatment of mange, a skin disease locally known as *chaid,* in goats and sheep.
6	*Dolomiaea costus* (Falc.) Kasana & A.K. Pandey.	Kuth	Asteraceae	JUH-17021	Herb	Roots	Musculoskeletal problems	Roots are Crushed form, mixed with maize dough and salt and given as a dose to cows and bulls as a treatment of arthritis, locally known as granu, a disease with joint pain symptoms.
							Respiratory/ pulmonary problems.	A small quantity of crushed roots is mixed with maize dough and given orally to cattle in case of cough.
							Digestive problems	The above formulation is also given to the cattle as a remedy fro dysentry.
7	*Girardinia diversifolia* (Link) Friis	Motti Aen	Urticaceae	JUH-16878	Herb	Roots	Musculoskeletal	Roots of Girardinia diversifolia and root bark of small Cedrus deodara tree are pounded together to form a paste which is mixed with black salt and applied externally in case of joint pains and fractures of cattle.
8	*Hordeum vulgare* L.	Jao	Poaceae	JUH-17031	Herb	Seeds	Urinary problems	Seeds are boiled in water, drained and given orally to cattle as a remedy for hematuria, localy known as *luntra.*
9	*Ipomoea batatas* (L.) Lam.	Shakar kandi	Convolvulaceae		Herb	Roots	Pregnancy and calving	The underground root tuber is Crushed form and administered orally to cows for expelling retained placenta after calving.
10	*Ipomoea purpurea* (L.) Roth		Convolvulaceae		Herb	Flowers	General	Flowers are Crushed form and given orally to cows to increase the lactation.
11	Koenigia polystachya (Wall. ex Meisn.) T.M.Schust. & Reveal	Amthila	Polygonaceae	JUH-16837	Herb	Leaves	General	Leaves are given orally to cattle in case of foot and mouth disease.

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12	*Nicotiana tabacum* L.	Tamaku	Solanaceae		Herb	Aerial parts	Skin problems	Aerial parts are Crushed form, boiled in water and deccotion applied topically in case of manges of goat and sheep.
13	*Oxyria digyna* (L.) Hill	Chukru	Polygonaceae	JUH-16838	Herb	Leaves	General	Leaves are Crushed form to paste which is given orally to cows, bulls, goats and sheep for treatment of Foot and Mouth Disease, locally known as kharedu.
14	*Persicaria nepalensis (Meisn.) Miyabe*	Zahar-ari-Dawa	Polygonaceae	JUH-16840	Herb	Leaves	Eye problems	Leaf juice is poured into the eyes of cows, bulls, goats and sheep as a treatment for cataract.
15	*Pinus wallichiana A.B.Jacks.*	Chil	Pinaceae	JUH-16887	Tree	Wood oil	General	Wood oil is appplied externally for healing infectious wounds.
16	*Pteris biaurita* L.	Kakei	Pteridaceae	JUH-16892	Fern	Roots	Gastrointestinal disorders	Roots are Crushed form and administered orally to cattle for treatment of loose motions.
17	*Pyrus pashia* Buch.-Ham. ex D.Don.	Kaith	Rosaceae	JUH-16858	Tree	Fruits	Eye problems	Fruits are chewed finely by a person and then sprinkled forcefully alongwith saliva from his mouth into the eyes of goats, sheep, cows and bulls for treatment of a local disease namely *andhlu* in which the whole eye including pupil becomes white accopanied with blindness.
18	*Rhododendron arboreum* Sm.	Cheu	Ericaceae	JUH-16795	Tree	Flowers	Urinary problems	Flowers are Crushed form and given to cows and bulls as a treatment of a disease viz. hematuria, locally known as luntra and the disease symptoms include presence of blood in urine.
19	*Rumex hastatus* D. Don.	Amloda	Polygonaceae	JUH-16843	Herb	Leaves	General	Leaves are Crushed form to paste which are given orally to cows, bulls, goats and sheep for treatment of Foot and Mouth Disease, locally known as kharedu.
20	*Sorbaria tomentosa* (Lindl.) Rehder	Kirdhay	Rosaceae	JUH-16863	Shrub	Flowers, fruits	Digestive problems	Crushed form flowers or fruits are given to cattle as a remedy for dysentry and abdominal pain.
21	*Ulmus wallichiana* Planch.	Maral	Ulmaceae	JUH-16877	Tree	Bark	Pregnancy and calving	Bark is boiled in water and decoction is administered orally to cows for expelling retained placenta after calving.
22	*Verbascum thapsus* L.	Gidad tamaku	Scrophulariaceae	JUH-16872	Herb	Aerial parts	Digestive problems	Leaves are Crushed form to paste which is administered orally to the cattle in case of constipation and colic pain.
							General	Aerial parts are Crushed form and given internally to lambs for treatment of fever.
							Skin problems	Aerial parts are Crushed form, boiled in water and deccotion applied topically in case of manges of goat and sheep.

CONCLUSION

Most of the tribal communities in UT of Jammu and Kashmir like Gaddi, Sippi, Gujjar, Bakerwal etc. are agro-pastoral herders. Their sustenance depends upon rearing of cattle and selling dairy products, wool and meat. These communities live on high altitude mountains

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where there is sufficient availability of grazing meadows for feeding their cattle. But, these areas lack medicinal facilities for treatment of humans and livestock. So, these communities are highly knowledgeable about utilization of local plants for obtaining crude drugs for treatment of both humans and livestock. Hence, there is a need to conserve the rich ethnoveterinary wisdom possessed by Gaddi tribe. The overexploitation of the ethnoveterinary plants should be avoided and measures should be taken for their conservation. Roots have been reported as the most used plant part in the present study. Medicinal plants whose roots are used in traditional medicines should be prioritised for conservation because uprooting a plant poses a threat to their survival. Phytochemical and pharmacological studies of the reported ethnoveterinary plants are recommended to ascertain their efficacy and safety.

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