

# Studies on Ethno-Veterinary Plant Species of Rajaji National Park and Adjoining Areas

Bharti Singh<sup>1</sup>, Saraswati Nandan Ojha<sup>1</sup>, Maneesha Singh<sup>2,\*</sup>

<sup>1</sup>Department of Botany, Uttarakhand Open University, Haldwani, Nainital, Uttarakhand, INDIA.

<sup>2</sup>Department of Botany, School of Basic and Applied Sciences, Shri Guru Ram Rai University, Patel Nagar, Dehradun, Uttarakhand, INDIA.

Submission Date: 09-06-2024; Revision Date: 22-06-2024; Accepted Date: 26-07-2024.

## ABSTRACT

**Aim:** The current study is being presented since there is insufficient data regarding the ethno-veterinary use of plant-based treatments in Uttarakhand and India for animal health. **Background:** Since the majority of people in India live in rural areas and the nation is predominantly agricultural, cattle in particular have a significant impact on the wellbeing of society and the economy. The Van Gujars of the Shivalik Hills in Uttarakhand are one of the many people that only rely on their livestock. The Van Gujjar people of Uttarakhand depend only on the production of milk and the distribution of milk products, in addition to providing the hill people with genetically superior offspring of native buffaloes. **Materials and Methods:** The study was carried out in the Rajaji Tiger Reserve and its surrounding regions, primarily in the Gohri, Ramgarh and Chilawali ranges. People residing in these places provided the information about plants used in ethno-veterinary medicine. **Results:** In all, 49 medicinal plants were used in the research area to treat a variety of illnesses and cattle. According to the results of the current study, the Gujjar populations that reside inside the Rajaji Tiger Reserve and the adjacent Van Gujjar woods in Uttarakhand still mostly rely on botanicals and common folk remedies to treat veterinary illnesses. They know a great deal about using traditional ethno-veterinary medicine to treat common ailments in their animals. **Conclusion:** Therefore, it is imperative that their traditional knowledge of the ethno-veterinary usage of medicinal plants be documented before it vanish.

**Keywords:** Livestock, Ethno-veterinary medicine, Medicinal plant.

## Correspondence:

**Professor (Dr.)**

**Maneesha Singh**

Department of Botany,  
School of Basic and  
Applied Sciences,  
Shri Guru Ram Rai  
University, Patel Nagar,  
Dehradun-248001,  
Uttarakhand, INDIA.

Email: maneeshasingh@  
sgrru.ac.in

## INTRODUCTION

India is predominantly an agricultural country with a rural population. The animals particularly cattle contribute significantly to the rural economy by giving jobs and income.<sup>[1]</sup> With around 535.78 million livestock owners, India has one of the largest livestock sectors in the world. It held the top two ranks in the world's population rankings with 109.85 million buffaloes and 148.88 million goats. The livelihood of almost

20.5 million people is derived from cattle.<sup>[1]</sup> Compared to the average of 14% for all rural households, livestock accounted for 16% of the revenue of small farm households. Two-thirds of rural communities depend on livestock for their livelihood.

Additionally, it employs approximately 8.8% of India's population. The livestock sector accounts for 4.11% of GDP and 25.6% of overall agricultural GDP. According to the Economic Survey 2020, the cattle sector has experienced a compound annual growth rate of 7.9% over the last five years. According to the Economic Survey-2021, Livestock's contribution to overall agriculture and allied sector Gross Value Added (at Constant Prices) grew from 24.32% in 2014-15 to 28.63% in 2018-19. Livestock revenue has become an essential supplementary source of income for rural families and a significant contributor to the agricultural

### SCAN QR CODE TO VIEW ONLINE



www.ajbls.com

DOI: 10.5530/ajbls.2024.13.53

economy. Farmers in India use a mixed farming system, which includes both crops and cattle.<sup>[2]</sup>

Only small populations rely only on livestock, like the Van Gujjars of the Shivalik highlands in Uttarakhand. These Gujjars are somewhat unknown compared to the Hindu Gujjars of North West India. According to recent reports, the vast majority of Van Gujjars are semi-nomadic Muslims who live in forests and herd cattle. They rely solely on the trees for feed, firewood, thatching material and timber for their houses. The Gujjars sell milk to local peoples as their primary source of income. In Uttarakhand, this community resided from Timli region of Dehradun and is found in the forests of Haridwar, Bijnor, Pauri Garhwal and Nainital districts. There are over 20,000 Van Gujjars in Uttarakhand. The economy of Van Gujjars of Uttarakhand is completely based on the production of milk and its products, development of genetically well-bred progenies of Indigenous cattle, and provide of ethno-veterinary services to the local farmers.<sup>[3,4]</sup>

Ethno-botanical studies play an important role in uncovering the history of plant uses and their relationships with humans. Tribal people around the world use natural or traditional herbal treatments and around 25% of medicines are derived from plants.<sup>[5-7]</sup> Approximately 65-80% of the world's population takes herbal remedies prepared from medicinal plants, according to the WHO.<sup>[8]</sup>

Even ancient literature such as the Vedas, Puranas and Nighantus contains several references to animal health care.<sup>[9]</sup> In the Himalayan region, where modern veterinary

health care systems are extremely limited, the locals have evolved their own traditional expertise for sustaining livestock health through age-old home cures.<sup>[1,10]</sup> Ethno-veterinary medicine deals with traditional animal health care, which includes knowledge, skills, methods and practices. Local plants used to cure traditional livestock and domestic bird ailments are commonly referred to as ethno-veterinarian medicinal herbs. Farmers produce crops along with ethno-veterinary medicine by combining age-old home treatments, religious practice along with modern methods to keep animals healthy and productive.<sup>[7]</sup> The current study proposes to investigate the ethno-veterinary plant species used by Gujjars in Rajaji Tiger Reserve and surrounding areas for its conservation and sustainability.

## MATERIALS AND METHODS

### Study area

The study will be conducted in Rajaji Tiger Reserve and adjoining areas mainly Chilawali, Ramgarh and Gohri ranges. It is an essential part of the Terai landscape between Sharda and Yamuna River<sup>[11]</sup> and extends over the Shivalik range from the Dehradun-Saharanpur Road in the North West to the Rawasan River in the southeast, which falls within the Gangetic bio-geographic zone.<sup>[12]</sup> It is spread in area of 1075 sq. km in three districts of Uttarakhand: Haridwar, Dehradun and Pauri Garhwal due to which the topography, altitude and climate of Rajaji Tiger Reserve vary greatly supporting a rich floristic diversity (Figure 1).

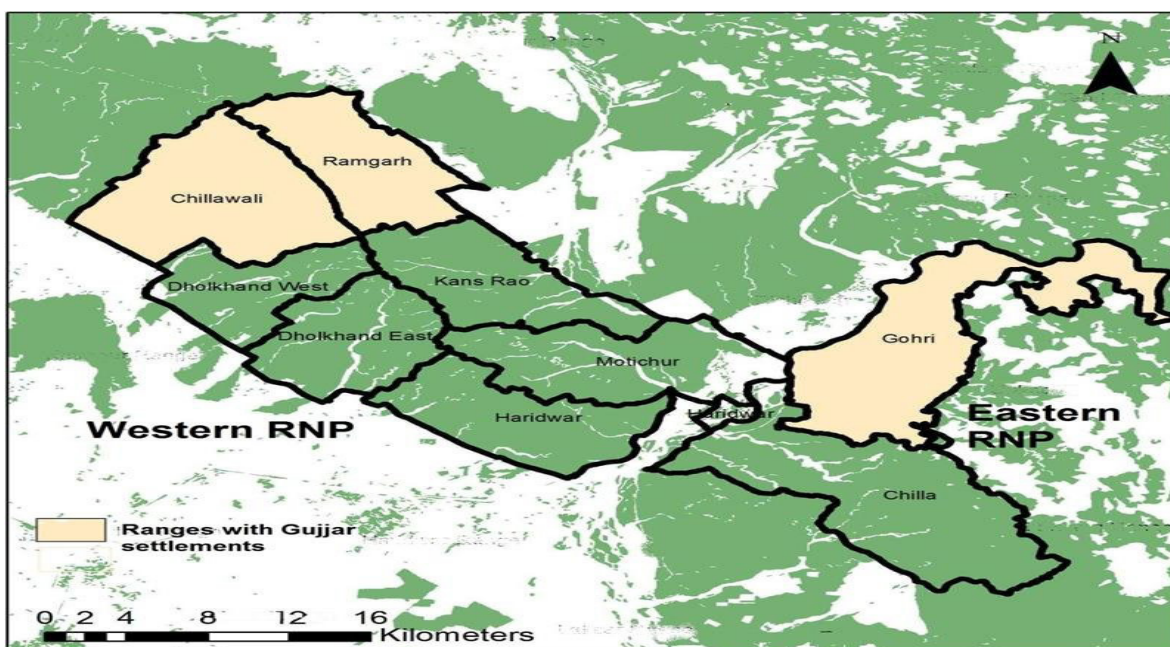


Figure 1: Map showing Gujjar locations (Chilawali, Ramgarh and Gohri) Rajaji National Park.

### Ethno-veterinary field survey

Field survey was conducted in different ranges (Chilawali, Ramgarh and Gohri) of Rajaji National Park. Information was collected regarding ethno-veterinary practices from local people residing in Chilawali, Ramgarh and Gohri Ranges of Rajaji National Park. Visits were carried out in each range with both the gender (male and female) of different age group for interview and group discussion. Information of plants used in ethno-veterinary medicine was collected from the people residing in these areas (Figure 2).

### Data Collection and Documentation

The data was obtained from different families representing various geographical regions in the Chilawali, Ramgarh and Gohri Ranges using the Participatory Rural Appraisal (PRA) technique. The total number of families in Ramgarh was two, Gohri eight and Chilawali twelve. Animal owners of various ages and genders were asked about traditional animal health care practices, specifically methods of treatment for their animals such as cows, buffaloes, goats and hens when they are sick. During the visit, information was gathered about prevalent livestock diseases, plant parts used and administration methods. Communities collected ethno-veterinary information

using a standard proforma created by Jain and Goel (1995).<sup>[13]</sup> The reported therapeutic plants were confirmed by checking the herbaria of the Forest Research Institute in Dehradun.<sup>[14-16]</sup>

### Data Analysis

The collected identified information from Chilawali, Ramgarh and Gohri ranges of Rajaji National Park were presented in Tables 1-3 which contains name of ailment, local name, symptoms, plant species used (botanical name) and use pattern.

## RESULTS

The present study was proposed due to lack of sufficient documentation about the ethno-veterinary uses of plant-based remedies in the healthcare choices of livestock in India. The Ethno-veterinary practices used by the communities of Rajaji Tiger Reserve were presented in the following heads which includes name of disease, local name, symptoms, affected animals, plant species used (botanical name) and use pattern.

### Chilawali range

Twenty-five medicinal plant species from the Chilawali area were utilized to treat 20 different animals and diseases (Table 1 and Figure 3). Mastitis (Thanela)



Figure 2 (a, b, c and d): Gujjar residing in Chilawali, Ramgarh and Gohri ranges of Rajaji National Park.

**Table 1: List of medicinal plant species of Chilawali range used against various livestock and diseases.**

Sl. No.	Name of disease	Local name	Symptoms	Affected animals	Plant species used (Vernacular name-Family)	Method of application
1.	Mastitis	Thanela	Blocking of the milk hole udder	Buffalo, Cow, Goat	<i>Curcuma domestica</i> (Haladi-Zingiberaceae)	Paste of Rhizome of <i>Curcuma domestica</i> with <i>Brassica campestris</i> oil is applied
2.	Mastitis	Thanela	Blocking of the milk hole udder.	Buffalo, Cow, Goat.	<i>Bombax ceiba</i> (Semal-Bombaceae)	Bark of <i>Bombax ceiba</i> mixed with seeds of <i>Glycine max</i> to treat thanela.
3.	Mastitis	Thanela	Blocking of the milk hole udder.	Buffalo	<i>Brassica campestris</i> (Sarso- Brassicaceae)	Brassica Oil is mixed with kapoor and Jaggery and given to cattle.
4.	Poisoning	Vish	Saliva from the mouth.	Buffalo, Cow, Goat	<i>Allium cepa</i> (Pyaj-Liliaceae)	Mixer of Bulb with black salt is used to drink with water.
5.	Poisoning	Vish	Saliva from the mouth.	Buffalo, Cow, Goat.	<i>Zingiber officinale</i> (Adrak-Zingiberaceae)	Mixer of Rhizomes with black salt is given to eat.
6.	Cough	Khansi	Frequent coughing.	Buffalo, Cow, Mule, Sheep, Goat, Horse.	<i>Dendrocalamus strictus</i> (Banss-Poaceae).	Eat green leaves of <i>Dendrocalamus strictus</i> with seeds of <i>Hordeum vulgare</i> .
7.	Fasciolitasis	Chhipadi	Growth of hard knot on the surface of thyroid gland.	Buffalo, Cow.	<i>Zanthoxylum armatum</i> (Timru-Rutaceae).	Eat a bark with pod of <i>Capsicum annum</i> .
8.	Anorexia	Bhook na lagna	Stops eating fodder.	Buffalo, Cow, Oxen, Sheep, Goat, Horse, Mule, Dog.	<i>Terminalia chebula</i> (Haira- Combretaceae).	Eat seeds of <i>Trachyspermum ammi</i> and bark of <i>Terminalia chebula</i> , rhizome of <i>Cuminum cyminum</i> , seeds of <i>Raphanus sativus</i> grind and mixed with black salt and used to eat.
9.	Constipation	Kabj	Dung is extra solid.	Buffalo, Cow.	<i>Bombax ceiba</i> (Semal-Bombaceae).	water extract of the bark of <i>Bombax ceiba</i> used to eat.
10.	Constipation	Kabj	Dung is extra solid.	Buffalo, Cow.	<i>Cassia fistula</i> (Amaltas- Caesalpiaceae).	Pod is directly used to eat.
11.	Foot and Mouth disease	Khuri	Infection of mouth and hoops.	Buffalo, Cow.	<i>Acacia catechu</i> (Supari-Mimosaceae).	Boiled bark of <i>Acacia catechu</i> with water is used to eat.
12.	Foot and Mouth disease	Khuri	Infection of mouth and hoops.	Buffalo, Cow.	<i>Mangifera indica</i> (Aam-Anacardiaceae).	Leaves are used
13.	Dermatitis	Damri	White patches and hair loss from the skin	Buffalo	<i>Stephania glabra</i> (Gindaru-Menispermaceae).	Paste of <i>Stephania glabra</i> with water used to eat.
14.	Boils	Danne	Boils on body.	Buffalo, Cow	<i>Bryophyllum pinnatum</i> (Dard mar - Crassulaceae)	Tie warm leaves on the affected area.
15.	Blot	Afara	Gloating of stomach.	Buffalo, Cow.	<i>Trachyspermum ammi</i> - (Ajawain-Apiaceae).	Paste of seeds of <i>Trachyspermum ammi</i> , rhizome of <i>Zingiber officinale</i> , <i>Ferula asafoetida</i> and fruit of <i>Piper nigrum</i> is used to cure blot.
16.	Lice and Ticks Infection (Ectoparasite)	Joon padna	Itching on the skin.	Goat, Buffalo, Cow.	<i>Artemisia nilagirica</i> (Kunja-Asteraceae).	Juice of leaves applied externally.
17.	Endo parasite	Peit main keera	Discharge of worms in the dung.	Buffalo, Cow.	<i>Asculus indica</i> (Panger-Hippocastanaceae).	Mature fruit is grind with water to drink.
18.	Sterility	Banjhpan	Obesity and eccentric behave.	Buffalo, Cow.	<i>Hordeum vulgare</i> (Jau-Poaceae).	Powder of seeds of <i>Hordeum vulgare</i> and <i>Triticum aestivum</i> , <i>Trigonella foenum</i> is eaten.

19.	Uterus disorder	Jair	Placenta membrane is held up inside the womb.	Buffalo	<i>Myrica esculenta</i> (Kafal- Myricaceae).	Bark is boiled with water and applied externally.
20.	Bone fracture	Hadi tootna	Swelling on the fracture part.	Buffalo, Cow	<i>Vanda testacea</i> (Laguli-Orchidaceae).	Paste of leaves are applied on fractured part.
21.	Diphtheria	Kand Rohni	Infection of the throat.	Cow	<i>Ficus religiosa</i> (Peepal-Moraceae).	Boiled extract of rhizome of <i>Zingiber officinale</i> and leaves of <i>Ficus religiosa</i> are given to drink.
22.	Acidity	Gais	Foul smell	Oxen, Horse, Mule	<i>Angelica glauca</i> (Choru-APIaceae).	Roots powder mixed with tea is used to drink to cure acidity.
23.	Vomiting	Ulti	Oozing waste material from the mouth.	Dog	<i>Hordeum vulgare</i> (Jau-Poaceae).	Fresh green leaves are directly applied to cure vomiting.
24.	Abdominal pain	Peit Shool	Frequent lying and standing movement.	Horse, Mule	<i>Cannabis sativa</i> (Bhang- Cannabaceae)	Smoke of <i>Cannabis sativa</i> and leaves of <i>Nicotiana tabacum</i> is used.
25.	Yoke galls	Kandha aana	Wounds and swelling on the neck.	Cow	<i>Ficus religiosa</i> (Peepal-Moraceae).	Boiled extract of rhizome of <i>Zingiber officinale</i> and leaves of <i>Ficus religiosa</i> is given to drink.

causes cattle's udders to enlarge and harden. To treat mastitis, the rhizome of *Curcuma domestica* was mixed with *Brassica campestris* oil and massaged, or the bark of *Bombax ceiba* was mixed with *Glycine max* seeds and ground with water for consumption. Also, oil extracted from *Brassica campestris* seeds was combined with kapoor and jaggery and fed to cattle. During poisoning, *Allium cepa* bulbs were ground and mixed with black salt before being drunk with water, or *Zingiber officinale* rhizomes were ground and mixed with black salt before being consumed.

Green leaves of *Dendrocalamus strictus* were ground with *Hordeum vulgare* seeds and used to treat coughs. In the case of fascioliasis, the bark of *Zanthoxylum armatum* was ground with a pod of *Capsicum annuum* and consumed. *Trachyspermum ammi* seeds, *Terminalia chebula* bark, *Cuminum cyminum* rhizome and *Raphanus sativus* seeds were ground and combined with black salt before being eaten to treat anorexia. During constipation, the bark of *Bombax ceiba* is ground with water to form a solution, which is then consumed, or the pods of *Cassia fistula* are eaten directly. Cattle suffering from foot and mouth illnesses exhibit signs such as a reddish tongue and boils in the oral cavity. As a remedy, *Acacia catechu* bark was boiled with water for making a solution and given to eat or the leaves of *Mangifera indica* were eaten directly. For dermatitis, a grind of *Stephania glabra* is given with water. To treat boils, warm the leaves of *Bryophyllum pinnatum* and tie them to the affected area. During the blot, animals were spotted kicking their feet at the belly and urinating frequently. Seeds of *Trachyspermum ammi*, rhizome of *Zingiber officinale*, *Ferula asafoetida* and

fruit of *Piper nigrum* are mixed and ground with water to form a paste to treat blot. *Artemisia nilagirica* leaves were pulverized and the juice applied externally to treat lice and tick infection. Mature fruit of *Asculus indica* was mixed with water and given to drink during endoparasite infection. For sterility, seeds of *Hordeum vulgare* and *Triticum aestivum* were milled with *Trigonella foenum* and the powder was given to eat with water. In case of uterus disorder, bark of *Myrica esculenta* was boiled with water and used externally. During bone fracture, grind the leaves of *Vanda testacea* to make a paste and apply on fractured part. The fractured part was supported by *Dendrocalamus strictus*. To treat Diphtheria, rhizomes of *Zingiber officinale* and leaves of *Ficus religiosa* were boiled in water and consumed. For acidity, *Angelica glauca* root powder was combined with tea and given to drink. To treat vomiting, fresh green *Hordeum vulgare* leaves were applied directly. In abdominal pain, resins extracted from *Cannabis sativa* and *Nicotiana tabacum* leaves were combined and burned over a flame, producing smoke.

### Ramgarh range

Twelve distinct medicinal plant species from the Ramgarh range were tested against 12 different livestock and diseases (Table 2 and Figure 3). Mastitis (Thanela) causes cattle's udders to enlarge and harden. Rhizomes of *Curcuma domestica* were combined with *Brassica campestris* oil is used to treat mastitis. During poisoning, the rhizomes of *Zingiber officinale* were ground and mixed with black salt before being eaten. Green leaves of *Dendrocalamus strictus* were ground with *Hordeum vulgare* seeds and used to treat

**Table 2: List of medicinal plant species of Ramgarh range used against various livestock and diseases.**

Sl. No.	Name of diseases	Local name	Symptoms	Affected animals	Plant species used (Vernacular name-Family)	Method of application
1.	Mastitis	Thanela	Blocking of the milk hole udder	Buffalo, Cow, Goat	<i>Curcuma domestica</i> (Haldi-Zingiberaceae)	Paste of rhizome of <i>Curcuma domestica</i> in oil of <i>Brassica campestris</i> is used to cure mastitis.
2.	Poisoning	Vish	Saliva from the mouth.	Buffalo, Cow, Goat.	<i>Zingiber officinale</i> (Adrak-Zingiberaceae).	Rhizomes of <i>Zingiber officinale</i> grind with black salt to eat.
3.	Cough	Khansi	Frequent coughing.	Buffalo, Cow, Mule Sheep, Goat, Horse.	<i>Dendrocalamus strictus</i> (Banss-Poaceae).	Paste of Green leaves of <i>Dendrocalamus strictus</i> and seeds of <i>Hordeum vulgare</i> is taken orally.
4.	Anorexia	Bhook na lagna	Stops eating fodder.	Buffalo, Cow, Oxen, Sheep, Goat, Horse, Mule, Dog.	<i>Terminalia chebula</i> (Haira- Combretaceae).	Mixer of seeds of <i>Trachyspermum ammi</i> and bark of <i>Terminalia chebula</i> , Rhizome of <i>Cuminum cyminum</i> , seeds of <i>Raphanus sativus</i> with black salt is used to eat.
5.	Constipation	Kabj	Dung is extra solid.	Buffalo, Cow.	<i>Bombax ceiba</i> (Semal-Bombaceae).	Milled the bark of <i>Bombax ceiba</i> with water to eat.
6.	Foot and Mouth disease	Khuri	Infection of mouth and hooves.	Buffalo, Cow.	<i>Acacia catechu</i> (Supari-Mimosaceae).	Bark of <i>Acacia catechu</i> boiled with water and used to eat.
7.	Boils	Danne	Boils on body.	Buffalo, Cow.	<i>Bryophyllum pinnatum</i> (Dard mar - Crassulaceae).	Warm leaves are tie on the affected area.
8.	Lice and Ticks Infection (Ectoparasite)	Joon padna	Itching on the skin.	Goat, Buffalo, Cow.	<i>Artemisia nilagirica</i> (Kunja-Asteraceae).	leaves juice is applied externally.
9.	Sterility	Banjhpan	Obesity and eccentric behave.	Buffalo, Cow.	<i>Hordeum vulgare</i> (Jau-Poaceae).	Powder of seeds of <i>Hordeum vulgare</i> and <i>Triticum aestivum</i> with <i>Trigonella foenum</i> is used to eat with water.
10.	Bone fracture	Hadi tootna	Swelling on the fracture part.	Buffalo, Cow.	<i>Vanda testacea</i> (Laguli-Orchidaceae).	Paste of leaves are apply on fractured part.
11.	Vomiting	Ulti	Oozing waste material from the mouth.	Dog	<i>Hordeum vulgare</i> (Jau-Poaceae)	Fresh green leaves are directly applied to cure vomiting.
12.	Abdominal pain	Peit Shool	Frequent lying and standing movements.	Horse, Mule.	<i>Cannabis sativa</i> (Bhang- Cannabaceae).	Smoke of leaves of <i>Cannabis sativa</i> and <i>Nicotiana tabacum</i> is used.

coughs. *Trachyspermum ammi* seeds, *Terminalia chebula* bark, *Cuminum cyminum* rhizome and *Raphanus sativus* seeds were ground and combined with black salt before being eaten to treat anorexia.

*Bombax ceiba* bark was ground with water to form a solution is used to cure constipation. Cattle suffering from foot and mouth illnesses exhibit signs such as a reddish tongue and boils in the oral cavity. As a cure, *Acacia catechu* bark was cooked with water to create a solution that was then consumed. To treat boils, warm the leaves of *Bryophyllum pinnatum* and tie them to the affected area. The leaves of *Artemisia nilagirica* were applied to affected parts of Lice and Tick infection. For sterility, seeds of *Hordeum vulgare* and *Triticum aestivum*

were milled with *Trigonella foenum* and the powder was given to eat with water. During a bone fracture, ground the *Vanda testacea* leaves into a paste and apply it to the broken portion. The shattered portion was supported with *Dendrocalamus strictus*. To treat vomiting, fresh green *Hordeum vulgare* leaves were applied directly. In the treatment of abdominal discomfort, resins derived from *Cannabis sativa* and *Nicotiana tabacum* leaves were combined and burned over a flame, producing smoke (Table 2).

### Gohri range

19 different medicinal plant species of Gohri range used against various livestock and diseases (Table 3 and

**Table 3: List of medicinal plant species of Gohri range used against various livestock and diseases.**

Sl. No.	Name of diseases	Local name	Symptoms	Affected animals	Plant species used (Vernacular name-Family)	Method of application
1.	Mastitis	Thanela	Blocking of the milk hole udder.	Buffalo, Cow, Goat.	<i>Curcuma domestica</i> (Haldi-Zingiberaceae).	Paste of rhizome of <i>Curcuma domestica</i> with oil of <i>Brassica campestris</i> is rubbed to cure mastitis.
2.	Mastitis	Thanela	Blocking of the milk hole udder.	Buffalo, Cow, Goat.	<i>Bombax ceiba</i> (Semal-Bombaceae).	Bark of <i>Bombax ceiba</i> mixed with seeds of <i>Glycine max</i> applied.
3.	Poisoning	Vish	Saliva from the mouth.	Buffalo, Cow, Goat.	<i>Allium cepa</i> (Pyaj-Liliaceae).	Bulb is mixed with black salt to drink.
4.	Poisoning	Vish	Saliva from the mouth.	Buffalo, Cow, Goat.	<i>Zingiber officinale</i> (Adrak-Zingiberaceae).	Paste of rhizomes of <i>Zingiber officinale</i> mixed with black salt to eat.
5.	Fascioliasis	Chhipadi	Growth of hard knot on the surface of thyroid gland.	Buffalo, Cow.	<i>Zanthoxylum armatum</i> (Timru-Rutaceae).	Bark of <i>Zanthoxylum armatum</i> milled with pod of <i>Capsicum annum</i> to eat.
6.	Anorexia	Bhook na lagna	Stops eating fodder.	Buffalo, Cow, Oxen, Sheep, Goat, Horse, Mule, Dog.	<i>Terminalia chebula</i> (Haira- Combretaceae).	Seeds of <i>Trachyspermum ammi</i> and bark of <i>Terminalia chebula</i> , rhizome of <i>Cuminum cyminum</i> , seeds of <i>Raphanus sativus</i> mixed with black salt to eat.
7.	Constipation	Kabj	Dung is extra solid.	Buffalo, Cow.	<i>Bombax ceiba</i> (Semal-Bombaceae).	Milled the bark of <i>Bombax ceiba</i> with water to eat.
8.	Constipation	Kabj	Dung is extra solid.	Buffalo, Cow.	<i>Cassia fistula</i> (Amaltas- Caesalpiniaceae)	Pod directly used to eat.
9.	Foot and Mouth disease	Khuri	Infection of mouth and hoofs.	Buffalo, Cow.	<i>Mangifera indica</i> (Aam-Anacardiaceae).	Leaves are eaten.
10.	Dermatitis	Damri	White patches and hair loss from the skin.	Buffalo	<i>Stephania glabra</i> (Gindaru-Menispermaceae)	Paste of <i>Stephania glabra</i> is used to eat.
11.	Boils	Danne	Boils on body.	Buffalo, Cow.	<i>Bryophyllum pinnatum</i> (Dard mar - Crassulaceae).	Warm leaves are tie on the affected area.
12.	Blot	Afara	Gloating of stomach.	Buffalo, Cow.	<i>Trachyspermum ammi</i> - (Ajawain-Apiaceae).	Paste of seeds of <i>Trachyspermum ammi</i> and rhizome of <i>Zingiber officinale</i> , <i>Ferula asafoetida</i> and fruit of <i>Piper nigrum</i> mixed with water to cure blot.
13.	Lice and Ticks Infection (Ecto parasite)	Joon padna	Itching on the skin.	Goat, Buffalo, Cow.	<i>Artemisia nilagirica</i> (Kunja-Asteraceae).	Juice of crushed leaves are applied externally.
14.	Endo parasite	Peit main keera	Discharge of worms in the dung.	Buffalo, Cow.	<i>Asculus indica</i> (Panger-Hippocastanaceae).	Mature fruit is used to drink.
15.	Uterus disorder	Jair	Placenta membrane is held up inside the womb.	Buffalo	<i>Myrica esculenta</i> (Kafal- Myricaceae).	Bark boiled with water and used externally.
16.	Bone fracture	Hadi tootna	Swelling on the fracture part.	Buffalo, Cow	<i>Vanda testacea</i> (Laguli-Orchidaceae).	Leaves paste is apply on fractured part and it is supported by <i>Dendrocalamus strictus</i> .
17.	Acidity	Gais	Foul smell	Oxen, Horse, Mule.	<i>Angelica glauca</i> (Choru-Apiaceae).	Roots powder mixed with tea to cure acidity.
18.	Vomiting	Ulti	Oozing waste material from the mouth.	Dog	<i>Hordeum vulgare</i> (Jau-Poaceae).	Fresh green leaves are directly applied to cure vomiting.
19.	Yoke galls	Kandha aana	Wounds and swelling on the neck.	Cow	<i>Ficus religiosa</i> (Peepal-Moraceae).	Rhizome of <i>Zingiber officinale</i> and leaves of <i>Ficus religiosa</i> boiled with water to drink.

Figure 3). Mixer of rhizome of *Curcuma domestica* with oil of *Brassica campestris* is rubbed to cure mastitis. During poisoning, the bulb of *Allium cepa* is ground and combined with black salt is used, The rhizomes of *Zingiber officinale* are ground and mixed with black salt to treat poisoning of cattle. In the case of fascioliasis, the bark of *Zanthoxylum armatum* is consumed with a pod of *Capsicum annuum*, *Trachyspermum ammi* seeds, *Terminalia chebula* bark, *Cuminum cyminum* rhizome and *Raphanus sativus* seeds were ground and combined with black salt to treat anorexia. During constipation, the bark of

*Bombax ceiba* is used with water. Cattle suffering from foot and mouth illnesses exhibit signs such as a reddish tongue and boils in the oral cavity. As a cure, *Mangifera indica* leaves were consumed.

For dermatitis, a mixer of *Stephania glabra* is given with water. Endoparasite infection in cattle results in loss of appetite, fever and swelling in the anal region. As a remedy, mature *Asculus indica* fruit was blended with water and given to drink. In the event of uterine disorders, the bark of *Myrica esculenta* was cooked with water and applied externally. For Yoke galls, rhizome of

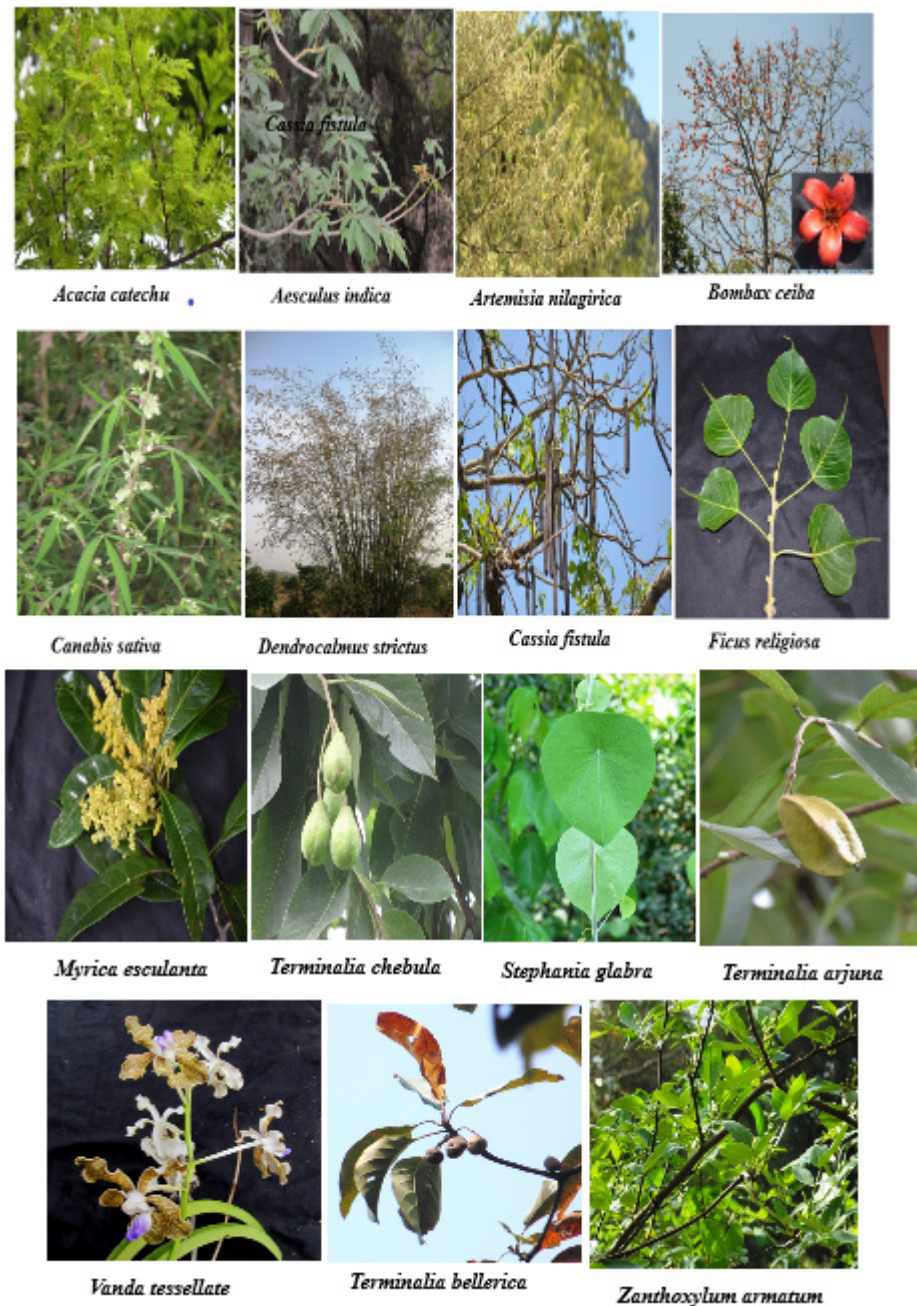


Figure 3: Plant species used to cure various livestock and diseases.



*Zingiber officinale* and leaves of *Ficus religiosa* boiled with water and solution was given to drink (Table 3).

## DISCUSSION

The livestock sector is a significant source of income for many people globally, notably the rural poor in developing countries. Ill-health is a serious impediment to livestock production and development in rural and peri-urban areas, where half of the world's cattle population lives. The majority of these communities reside in environments prone to endemic infections, vectors and illnesses. Although livestock owners can recognize and diagnose disease problems in their herds, a survey revealed that 95% do not seek veterinarian services, with the exception of cattle dipping, which are legally mandated. Cattle owners reported high prescription and service costs, while some perceived veterinary health care as harming livestock during illness outbreaks, prompting them to avoid seeking help. The remaining 5% buy veterinary drugs for their animals without consulting with expert practitioners.<sup>[17]</sup> Traditional systems of medicine, including those for veterinary care, often possess unique knowledge passed down through generations within specific communities. These systems rely on a combination of medicinal plants, surgical techniques, husbandry practices and sometimes magico-religious rituals to treat various ailments in livestock. The knowledge is typically transmitted orally from one generation to the next within families or communities. Research conducted by Kala (2005), McCorkle (1995) and Phondani *et al.* (2010) highlights the significance of these traditional veterinary practices, which have been relied upon for centuries.<sup>[3,4,6]</sup> They emphasize the effectiveness, accessibility and absence of side effects associated with these methods.<sup>[10]</sup>

In India, the sacred books of the Vedic religion supplied the oldest information on the traditional (indigenous) system of veterinary medicine among several Indian ethnic groups. In India, the government's veterinary healthcare infrastructure is insufficient to serve the entire livestock population. Uttarakhand state has an area of around 82 blocks and 15,366 villages, with just 248 veterinary facilities and 506 veterinary dispensaries. The majority of hospitals are located in district headquarters or blocks and the facilities are only used by roadside communities. Veterinary hospitals and dispensaries are far from isolated settlements. That is why the majority of animal raisers in India particularly in Himalayan region, have developed their own traditional knowledge

for maintaining their livestock health through age-old home remedies due to poor modern facilities.<sup>[18-22]</sup>

In the present study, a total of Twenty diseases have been studied among the cattle in Chilawali, Ramgarh and Gohri ranges of Rajaji National Park, Uttarakhand, India. Twenty-two plant species belonging to nineteen different families has been used to treat these diseases by Gujjars. Important plants with its families used for treatments were *Curcuma domestica* (Zingiberaceae) and *Zingiber officinale*, Bombaceae- *Bombax ceiba*, Brassicaceae- *Brassica campestris*, Liliaceae- *Allium cepa*, Poaceae- *Hordeum vulgare* and *Dendrocalamus strictus*, Rutaceae- *Zanthoxylum armatum*, Combretaceae- *Terminalia chebula*, Caesalpinaceae- *Cassia fistula*, Mimosaceae- *Acacia catechu*, Anacardiaceae- *Mangifera indica*, Menispermaceae- *Stephania glabra*, Crassulaceae- *Bryophyllum pinnatum*, Apiaceae- *Trachyspermum ammi* and *Angelica glauca*, Asteraceae- *Artemisia nilagirica*, Hippocastanaceae- *Asculus indica*, Myricaceae- *Myrica esculenta*, Orchidaceae- *Vanda testacea*, Moraceae- *Ficus religiosa* and Cannabaceae- *Cannabis sativa*.

Zingiberaceae and Poaceae were the most prevalent of the nineteen families. The most prevalent form of administration was found to be oral. In most cases, raw plant parts were fed alongside fodder, but in certain home cures, wheat husk, jaggery, kapoor, black salt and tea were blended with medicinal plants to eliminate their bitterness, allowing cattle to feed more comfortably. Due to a lack of surrounding medical facilities, the inhabitants in this area rely on plant-based medication to treat a wide range of livestock ailments. The plants utilized by Gujjars for traditional ethno-veterinary medicines were abundant in the forest, ensuring both efficiency and livestock safety. Studies conducted by Matekair and Bwakura in 2004 in Zimbabwe (Mashonaland East, West and Central) reported that farmers used traditional veterinary treatments for 14 diseases in farm animals.<sup>[16]</sup> They offered a range of traditional remedies as well as methods of preparation and administration of orthodox veterinary medications. High levels of botanical consistency and veterinary consistency, respectively, were seen for specific remedies for septic wounds (61%, 89%), helminthes (average, 61%, 61%), retained afterbirth (63%, 71%), eye problems (74%, 83%), delayed parturition (51%, 67%) and fractures (68%, 72%). Standardization and validation of traditional knowledge is necessary to fully integrate ethno-veterinary medicine into orthodox veterinary medicine. Similarly Sunder and his associates in 2014 in the villages of Andman and Nicobar island reported that majority of populations depend on locally

available plants to cure their animals and poultry.<sup>[23]</sup> Due to remote locality, they develop their own methods or, from their ancestors through the words of mouth. A total 41 plants belongs to 27 families were identified with ethano-veterinary importance.<sup>[23]</sup>

Studied in Ethno-veterinary area by Mahdy and his coworkers in 2019 revealed that large numbers of plants were used by farmers as treatments for healing some disorders at cows.<sup>[22]</sup> Most of the plants have complex action, but most can be used in treatment of gastrointestinal disorder, mastitis and wound healing, antiparasitic in spontaneous flora of Romanian pastures. There were 66 plant species which belong to a large number of families, but most plants belong to the family Asteraceae (11-16.66%), followed by species of family Solanaceae (6.06%) and family: Malvaceae, Adoxaceae, Convolvulacea, Euphorbiaceae, Fabaceae with 3 species each (4.54%). Of the plants, 11 species (16.8%) are considered to be toxic and 18 (27.2%) potentially toxic but, have therapeutic effect in extremely small amounts. According to the study's findings, many traditional healers live in rural places and have extensive undocumented traditional knowledge of animal ailments, herbal therapies and herbal formulations. However, increasing industrialization threatens to extinguish this crucial veterinary expertise. Traditionally, animal husbandry practices have been passed down from generation to generation, but the younger generation is less interested in them. Because of this attitude, significant information on ethno-veterinary medicine is disappearing. In this regard, documenting and applying this traditional knowledge within broader society could indeed offer valuable insights into alternative and holistic approaches to veterinary healthcare. By recognizing, preserving and integrating these practices into mainstream veterinary care, we can potentially enhance animal health outcomes while also respecting and preserving cultural heritage.

## CONCLUSION

Traditional herbal medicine plays an important part in satisfying Van Gujjars' livestock healthcare demands, making it a sustainable practice. The recent study concluded that the Gujjar populations residing within the Rajaji Tiger Reserve and adjacent areas. Van Gujjars of Uttarakhand forests continue to rely heavily on flora and traditional medicines to treat veterinary problems. The study also demonstrates that they have extensive understanding of traditional ethno-veterinary treatment for treating common cattle ailments. Some of the plants mentioned in the literature are commonly utilized and readily available in the wild.

The locals and Gujjars have their unique knowledge of plant exploitation, which is passed down from generation to generation. The indigenous wisdom of these tribes is rapidly dwindling as a result of changing lifestyles. There is an urgent need to chronicle their traditional knowledge of ethno-veterinary medicinal plant use before it is lost in the future. These communities employ a significant number of therapeutic plants, which depletes biological resources. Over-exploitation of medicinal plants should be addressed by raising awareness among people through workshops, seminars and trainings on how to cultivate additional plants.

## ACKNOWLEDGEMENT

Authors are grateful and express sincerely thanks to Prof. (Dr.) Arun Kumar, Dean, School of Basic and Applied Sciences, Shri Guru Ram Rai University, Patel Nagar Campus, Dehradun for his kind support and suggestions.

## CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

## SUMMARY

India is predominantly an agricultural country with a large rural population, therefore, animals, particularly cattle, play an important role in the economy and social welfare. The Van Gujjars of Uttarakhand's economy is entirely dependent on milk production and milk product delivery, as well as the provision of genetically well-bred progenies of indigenous buffaloes to the hill people. The current study was conducted in response to a lack of appropriate data about the ethno-veterinary uses of plant-based treatments in livestock healthcare in India and Uttarakhand. The study was carried out in Rajaji Tiger Reserve and its surrounding areas, primarily the Chilawali, Ramgarh and Gohri ranges. People who live in these places provided information on plants used in ethno-veterinary medicine. A total of 49 medicinal plant species from the investigated area were used to treat various livestock and diseases. The recent study concluded that the Gujjar populations residing within the Rajaji Tiger Reserve and adjacent areas. Van Gujjars of Uttarakhand forests continue to rely heavily on flora and traditional medicines to treat veterinary problems. They are well knowledgeable about traditional ethno-veterinary medicine and how to treat common cattle ailments. As a result, there is an urgent need to chronicle their traditional knowledge of ethno-veterinary medicinal plant use before it is lost in the

future. To address over-exploitation of medicinal plants, individuals should be educated through workshops and seminars.

## REFERENCES

- Samal PK, Shah A, Tiwari SC and Agrawal D K. Indigenous health care practices and their linkage with bioresources conservation and socio-economic development in central Himalayan region of India. *Indian J Traditional Knowledge*, 2004;3(1):12-26.
- Jain G, Ajit Singh A, Singh NJ, Auddy N, Jain R. Overview of Basic Livestock Statistics in India. In book: *Advances In Veterinary Sciences*. Publisher: Akinik Publications 2023;8:69-84. DOI:10.22271/ed.book.1094
- Kala CP. Indigenous uses, population density and conservation of threatened medicinal plants in protected areas of the Indian Himalayas. *Conservation Biology*, 2005;19(2):368-78.
- Phondani PC, Maikhuri RK and Kala CP. Ethno-veterinary uses of medicinal plants among traditional herbal healers in Alaknanda catchment of Uttarakhand, India. *Afr. J. traditional CAM*, 2010;7(3):195-206.
- Kumari N, Radha R, Kumar M and Mekhemar M. Therapeutic uses of wild plant species used by rural inhabitants of Kangra in the western Himalayan region. *South African Journal of Botany*, 2022;148:415-36.
- McCorkle CM. Back to the future: Lessons from ethno-veterinary RD and E for studying and applying local knowledge. *Agriculture and Human Values*, 1995;12(2):52-80.
- Radha P, Udhayavani C, Nagaraj R, Sivaranjani K. Documentation and quantitative analysis of the traditional knowledge on medicinal plants in Udumalpet Block, Tiruppur District, Tamil Nadu, India. *Acta Ecologica Sinica*. 2022;42(2):122-42
- WHO (2011). *World Health Organization Traditional Medicine*. WHO Fact Sheet No 134. Geneva; Switzerland Available online at URL: [http://whqlibdoc.who.int/fact\\_sheet/2002/FS\\_134\\_revised.pdf](http://whqlibdoc.who.int/fact_sheet/2002/FS_134_revised.pdf).
- Jain SK and Srivastava S. Some folk herbal medicines for possible use in veterinary practices. *Indian J Traditional Knowledge*, 2003;2(2):118-125.
- Shrivastava S, Jain AK and Tomar RS. Ethno-veterinary practices-a review on phytotherapeutical approaches in treatment of animals. *World Journal of Pharmaceutical and Medical Research*, 2017;3(1):96-100.
- Akash, Navneet, Bhandari, B S. A Community Analysis of Woody Species in a Tropical Forest of Rajaji Tiger Reserve Environment and Ecology, 2019; 37 (1) : 48-55.
- Rodgers WA, Panwar HS and Mathur VB. *Wildlife Protected Area Network in India: A Review, Executive Summary*. Wildlife Institute of India, Dehradun: 2002;1-51.
- Raizada MB and Saxena H. *Flora of Mussorie*. Bishen Singh Mahendra Pal Singh, Dehradun, 1978.
- Gaur RD, Bhatt KC and Tiwari JK. An ethnobotanical study of Uttar Pradesh Himalaya in relation to veterinary medicines. *J Indian Bot Soc.*, 1992;72:139-144.
- Duthie JF. *Flora of the Upper Gangetic Plain and of the adjacent Siwalik and Sub Himalayn tracts*. 1903;3, Superintendent of Government Printing, Calcutta.
- Matekaire T, Bwakura Taona M. *Ethno-veterinary Medicine: A Potential Alternative to Orthodox Animal Health Delivery in Zimbabwe*. *Intern J Appl Res Vet Med*, 2004;2(4):269-73.
- Bhatt A, Singh P, Kumar V and Baunthiyal M. Documentation of Ethno-veterinary practices used for treatments of different ailments in Garhwal Himalayan Region. *J Environ Nanotechnol*, 2013;2:22-9.
- Gaur RD. *Flora of District Garhwal, Northwest Himalaya: with ethnobotanical notes*. Transmedia Publishing, Srinagar, Garhwal, Uttarakhand, India, 1999.
- Khadda BS, Singh B, Singh DV, Singh JL, Singh S K, Singh CB and Singh D. Inventory of traditional ethno-veterinary practices followed by goat keepers in Uttarakhand. *Indian J Traditional Knowledge*, 2018;17(1):155-61.
- Pande PC and Joshi GC. *Kumaon Himalaya ke pashu- chikitsaadi main pairh-paudhon ka upyog*. In: *Ethnobotany of Kumaon Himalaya*. Scientific Publishers, Jodhpur, 1999;113.
- Tiwari L and Pande PC. Ethno-veterinary medicines in India perspective; reference to Uttarakhand, Himalaya. *Indian J Traditional Knowledge*, 2010;9(3):338-343.
- Mahdy Cristina EL, Popescu S, Borda C and Blaga Petrean A. Plants Used in Ethno-veterinary Medicine in Cows. A Review. *Bulletin UASVM Animal Science and Biotechnologies*, 2019;76(2):61-76.
- Sunder J, Sujatha T, Kundu A, Kundu MS. Medicinal plant and ethno-veterinary practices used in south and north Andman. *Journal of Andman Science Association*, 2014;19(1):106-15.

**Cite this article:** Singh B, Ojha SN, Singh M. Studies on Ethno-Veterinary Plant Species of Rajaji National Park and Adjoining Areas. *Asian J Biol Life Sci*. 2024;13(2):421-31.