

# Statistical analysis of Ethno-veterinary plants from Bhil, Pawra, Tadvi and Korku tribes of Buldhana district, Maharashtra: A benevolence for health of native animals

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## Abstract

The tribal communities like Bhil, Pawra, Tadvi and Korku are gold mines of traditional veterinary knowledge as they have been using plants to keep their livestock healthy and free from diseases. Several factors of modern civilization day by day is getting diminished this knowledge. The present research study was goal to survey and document the medicinal plants used to treat various livestock diseases traditionally by these tribal communities in the Buldhana district, Maharashtra, India. Survey was conducted in 18 villages of Buldana district, during 2019-2021. Information was collected from the tribals using rapport, semi-structured questionnaires and analyzed quantitatively using various statistical parameters. The total of 39 medicinal plant species belonging to 23 families of 39 genera were documented. It was found that the plant species which predominantly used are herbaceous (68.93%). The most commonly used plant part in the herbal preparations were leaves (34.79%), fruits (26.08%), roots/tubers (19.57%), seeds (13.04%), Gum (4.34%) and flowers (2,18%). Use-value, fidelity level percentage and use report were obtained to be in the range of 0.03-0.33, 3.7-100% and 1-27 respectively. Based on values, *Balanites roxburghii* Planch. was found to be the most important and dominant species used by the tribes. Maximum number of plant species (39 species) were used to treat the gastrointestinal disorders.

**Key words:** Statistical analysis, Ethnoveterinary, Tribal, Buldhana

## Introduction

The experience, practices, beliefs and skills of indigenous communities in curing various ailments of livestock is a holistic body of ethno-veterinary knowledge. Ethno-veterinary medicine is a universal interdisciplinary study of the local knowledge and the socio-cultural structures and environment associated with animal health care and husbandry (Tiwari and Pande, 2010). The knowledge of ethno-medicinal plants, mode of administration and doses varies across countries, regions, and communities. Hence, to keep animals healthy, traditional healing practices have been applied for centuries and have been passed down orally from generation to generation (Phondani *et al.*, 2010).

The various rural herbal healers, ethnic communities across the world as they are useful, readily available with minimal side effects, and provide low-cost alternative herbal medicines to allopathic drugs (McCorkle and Green, 1998). The use of ethno-veterinary practices to treat and control livestock diseases is an old practice in large part of the world, particularly developing countries where animal health service facilities are still very poor and are found scarcely located at urban area (Sinha *et al.*, 2002). In India, ethnoveterinary medications have been used since ancient times. The 'Atharvaveda' is a repository of traditional medicine that includes prescriptions to treat animal diseases. Widespread interest in documenting and validating ethnoveterinary practices arose in the early 1980s. These activities have saved ethnoveterinary knowledge from extinction because most knowledge resided with elderly community members and disappeared as they died (Toyang *et al.*, 2007). There are rich and fruitful ethnoveterinary traditions that form an integral part of the tribal family and have an important religious and economic social role. In remote, rural, small villages as well as forest area marginal, small-scale farmers and landless workers, they have maximum number of livestock. The poor, educationally backward tribal communities live far away from town and cities and are depend on ethno-medicine. Literature reveals various workers have documented the traditional ethnoveterinary knowledge from Maharashtra (Jambu and Wath, 2018). The district of Buldhana is fairly rich from the point of biodiversity (Diwakar and Sharma, 2000), agrobiodiversity and diversity of human culture (Anonymous, 1976). Screening of literature suggested that the studies on the ethnoveterinary uses of plant species is lack in the Buldhana district of Maharashtra. A special attention has been made to document and describe gastrointestinal disorders and their remedies practiced by Bhil, Pawra, Tadvi and Korku communities of district Buldhana, Maharashtra.

## Material And Methods

### Study Area

Vidarbha is the eastern region of the Indian state of Maharashtra comprising of 11 districts. It borders the state of Madhya Pradesh to the north, Chhattisgarh to the east, Telangana to south and Marathwada & Khandesh regions of Maharashtra to the west.

Buldhana district located at the westernmost border of Vidarbha region and is lies between 19°51' to 21°17' North latitude and 75°57' to 76°59' East Longitude. It is bounded on the North by Madhya Pradesh, on the South by Parbhani District on the west by Jalna and Jalgaon Districts and on the North East by Amravati and Akola District. The principal rivers in the district are Painganga and Purna. The other important rivers are the Khadakpurna, Nalganga, Vishwaganga and Dnyanganga. There are two medium irrigation project of the river Nalganga and Dnyanganga in the district. The total area of the district is 9661 Sq. Kms. which is about 3.14% of the total area of Maharashtra State. During the year 2010-11, an estimated 840.66 Sq. Kms of area was under forest which constituted 8.70% of the total area. The Buldhana district consists of 13 tahsils and 1433 villages (Anonymous, 2016)

The district is rich in terms of biodiversity nurturing various rare, endemic and threatened plants. The vegetation usually comprises dry deciduous. The vegetation

basically belongs to the teak (*Tectona grandis* L.) forest, with fair presence of Babhul (*Acacia nilotica* (L.) Del., Salai (*Boswellia serrata* Roxb.ex Coleb.), Kuda (*Holarrhena pubescens* (Buch-Ham.) Wall. ex G.Don), Anjan (*Hardwickia binata* Roxb.) Dudhi (*Wrightia tinctoria* R.Br.), Palas (*Butea monosperma* (Lamk) etc.

### Survey and data collection

Extensive field survey has done to document ethnoveterinary practices which are used by ethno-veterinary medicine practitioners, rural and tribal people of different parts of Buldhana district. A survey sheet/ data sheet has carefully prepared for documentation. Field survey was carried out in such a way that data will be useful for credibility assessment using statistical analysis. Weekly tours have organized with the local informants to observe the ethno-veterinary practices in rural as well as tribal areas of the region. Local or tribal people were interviewed in most formal way. Personal details about informants have entered on data sheet. Information like the name (common/vernacular/local name) of plant, the parts used, mode of use, name of animal disease treated, ingredients used, method of crude drug preparation, route of drug administration, methods of application, dosage, period of treatment etc. has been noted down. The ethno-veterinary medicinal plant species has collected during the field trips and brought to the laboratory. Plant species have been identified using standard floras (Naik, 1998; Sharma *et.al.*1996; Singh *et al.*, 2001). Herbarium specimens has prepared and deposited in the PG department of Botany, Nanded Education Society's Science College, Nanded.

### Data analysis

The credibility assessment of ethnoveterinary practices of Buldhana district was carried out by using statistical analysis of data collected during field survey and literature survey. The statistical analysis includes use value (UV), informant consensus factor (ICF), fidelity level (FL) etc. (Philips *et.al.*, 1994; Tardio & Pardo-de Santayana, 2008; Heinrich *et. al.*, 1998; Friedman *et. al.*, 1986)

### Use value (UV)

When the plant is important, it has high use reports and high Use-value, and vice-versa.  
 $UV_s = \sum U / n$

Where, U refers to the number of use-reports cited by each informant for that plant species and n is the total number of the informants interviewed.

### Informant consensus factor (ICF)

To determine the homogeneity for a particular plant species, all the diseases of the livestock were broadly classified into 9 categories and the Informant consensus factor was calculated using the following equation:

$ICF = \frac{nur - nt}{nur} - 1$  Where, **nur** is the total number of use-reports of a category, and **nt** is the number of species used for the category. ICF values approach 1 when there is the exchange of knowledge among the informants and is near 0, when there is no exchange of knowledge among the informants and chose plants randomly.

### Fidelity level (FL)

To know the percentage of informants showing a preference for a particular plant species over others in the treatment of ailment, Fidelity level was calculated using the below-given equation:

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

Where  $N_p$  is the number of use-reports for a given species for a particular ailment category and  $N$  refers to the total number of informants stating the plant useful for any ailment category.

### Results and Discussion

Present research work was carefully documented the plant species with ethnoveterinary importance in the study area. In survey, the total of 68 informants belonging to the age group between 40-84 were interviewed for the documentation of traditional veterinary knowledge from twenty-nine villages of Buldhana district. Most of the informants were males, i.e., 66 (97.05%), and the rest 2 (2.05%), were females. The maximum informants were from the tribal community of Bhil, Pawra, Tadvi and Korku of the study area. The majority of them are poorly educated people i.e., up to the primary level education. The informant's participation below 50 yrs was less, whereas; older informants are relevant and more correct in ethnoveterinary knowledge. The present investigation represents 39 plant species, 39 genera belonging to 23 families, which are being used by the tribal as ethnoveterinary medicine to treat diverse group of ailments (Table 1). Fabaceae (7) species is most dominant family, Apiaceae (4), Cucurbitaceae (4), Malvaceae (2), Sapindaceae (2), Moraceae (2), Lamiaceae (2), and single species belongs to family Simaroubaceae, Vitaceae, Aristolochiaceae, Zygophyllaceae, Brassicaceae, Apocynaceae, Boraginaceae, Zingiberaceae, Dioscoreaceae, Asparagaceae, Myrtaceae, Acanthaceae, Sapotaceae, Euphorbiaceae, Combretaceae and Solanaceae. The most commonly used plant part in the herbal preparations were leaves (34.79%), fruits (26.08%), roots/tubers (19.57%), seeds (13.04%), Gum (4.34%) and flowers (2.18%). Use value, Fidelity level percentage and use report were obtained to be in the range of 0.03-0.33, 3.7-100% and 1-27 respectively. Based on values, *Balanites roxburghii* Planch. was found to be the most important and dominant species used by the tribes. Maximum number of plant species were used to treat the gastrointestinal disorders (Table 1). In the present study, novel ethnoveterinary use for ten plant species viz., *Ailanthus excelsa* Roxb., *Balanites roxburghii* Planch., *Caesalpinia bonduc* (L.) Roxb., *Citrullus colocynthis* (L.) Schrad., *Corallocarpus epigaeus* (Rottler) Hook. f., *Dioscorea hispida* Dennst., *Ferula assa-foetida* L., *Senna auriculata* (L.), *Thespesia populnea* (L.) Sol. Ex. Correa, *Trichosanthes tricuspidata* Lour. were recorded. Statistical analysis shows that the fidelity level ranges up to 100% for medicinal utilization of some plant species (Table 1). Total number of use reports were found to be 101 where as ICF value was higher for Deficiency diseases (0.87) Followed by Ophthalmic disease (0.86), Dermal disease (0.85), Reproductive disease (0.85) (Table 2). Ethnoveterinary practices by tribals of nearby villages of Dnyanganga wild life sanctuary, Buldhana, Maharashtra was carried out in early studies and reported thirteen families (Patil and Rothe, 2017).

Table 1: List of ethnoveterinary plants used by Bhil, Pawra, Tadvi and Korku tribes of Buldhana district along with UV and RFC

	Plant name	Local name	Family	Plant part used and mode of Administration	Use Value	Use Report	NP	N	FL% = NP/N X 100
1	<i>Abrus precatorius</i> L	Gunj	Fabaceae	Root powder along with water is used to cure diarrhoea.	0.03	2	1	2	50
2	<i>Ailanthus excelsa</i> Roxb.	Maharukh	Simaroubaceae	Leaves juice & buttermilk mixture use to cure diarrhoea.	0.25	17	2	17	11.76
3	<i>Ampelocissus latifolia</i> (Roxb.) Planch.	Ran draksha	Vitaceae	Tuberous root is recommended to cure dysentery. As well as to cure diarrhoea.	0.13	9	6	9	66.66
4	<i>Arachis hypogaea</i> L.	Bhuimung	Fabaceae	Seed oil mix with salt and given orally to cure tympany.	0.07	5	2	5	40
5	<i>Aristolochia bracteolata</i> Lam.	Naygadhan/ Kidamari	Aristolochiaceae	Juice is given to cure dysentery.	0.04	3	2	3	66.66
6	<i>Balanites roxburghii</i> Planch.	Hinganbet	Zygophyllaceae	Fruit powder is recommended to cure dysentery.	0.39	27	1	27	3.7
7	<i>Brassica juncea</i> (L.) Czern.	Mohari	Brassicaceae	Seed oil recommended to cure tympany.	0.05	4	3	4	75
8	<i>Caesalpinia bonduc</i> (L.) Roxb.	Sagargoti	Fabaceae	Seed mix with Vitex roots and lemon juice to treat eye disorders. Seed mix with Naphthalene ball and used to cure diarrhoea.	0.03	2	1	2	50
9	<i>Calotropis procera</i> (Aiton) Dryand.	Rui	Apocynaceae	2 to 3 Young leaves are given orally, recommended to cure tympany.	0.33	23	15	23	65.21
10	<i>Capparis sepiaria</i> L.	Pilukathar	Fabaceae	Leaves juice is used to cure dysentery.(06)	0.09	7	6	7	85.71
11	<i>Cardiospermum halicacabum</i> L.	Doksa Phodi	Sapindaceae	Leaves mix with Vitex leaves, recommended to cure tympany.	0.01	1	1	1	100

12	<i>Citrullus colocynthis</i> (L.) Schrad.	Kadu Indrayan	Cucurbitaceae	Fruit extract used to cure tympany/blotting.	0.14	10	8	10	80
13	<i>Clitoria ternatea</i> L.	Aparajita/Gokarna	Fabaceae	Leaves extract used to cure tympany.	0.03	2	1	2	50
14	<i>Corallocarpus epigaeus</i> (Rottler) Hook. f.	Mirchi Kand	Cucurbitaceae	Tuber powder is recommended to cure diarrhoea. Tuber powder is recommended to cure dysentery. Tuber powder used to cure tympany.	0.27	19	6	19	31.57
15	<i>Cordia dichotoma</i> G.Forst.	Sadhi Gondhan	Boraginaceae	Leaves juice is recommended to cure dysentery.	0.03	2	2	2	100
16	<i>Coriandrum sativum</i> L.	Kothambir	Apiaceae	Fruit Powder mix with oil used to cure tympany.	0.05	4	1	4	25
17	<i>Cuminum cyminum</i> L.	Jire	Apiaceae	Powder and oil mixture is used to cure diarrhoea.	0.01	1	1	1	100
18	<i>Curcuma longa</i> L.	Halad	Zingiberaceae	Rhizome extract used to cure tympany.	0.01	1	1	1	100
19	<i>Dalbergia latifolia</i> Roxb.	Sisam	Fabaceae	Leaf Juice is given in dysentery. Leaf Juice is given in diarrhoea.	0.06	4	4	4	100
20	<i>Dioscorea hispida</i> Dennst.	DukkarKand	Dioscoreaceae	Tuber powder is given along with water to cure dysentery.	0.01	1	1	1	100
21	<i>Drimia indica</i> (Roxb.) Jessop	Ran kanda	Asparagaceae	Bulb powder is recommended to cure dysentery.	0.03	2	1	2	50
22	<i>Eucalyptus globules</i> Labill.	Nilgiri	Myrtaceae	Oil extracted from leaves is given to cure tympany. Oil used to cure constipation.	0.04	3	3	3	100
23	<i>Ferula assa-foetida</i> L.	Hing	Apiaceae	Gum is used in the treatment of blotting. Gum powder used to cure constipation.	0.07	5	2	5	40
24	<i>Ficus benghalensis</i> L.	Vad	Moraceae	Young prop roots extract used to cure tympany.	0.03	2	1	2	50
25	<i>Hibiscus rosa-sinensis</i>	Jaswand	Malvaceae	Leaves juice is used to cure diarrhoea.	0.06	4	4	4	100



26	<i>Justicia adhatoda</i> L.	Adulsa	Acanthaceae	Leaves useful on Stomach disorder, tympany.	0.01	1	1	1	100
27	<i>Madhuca longifolia</i> (J. Koenig ex L.) J.F.Macbr.	Moha	Sapotaceae	Flowers extract used to cure tympany.	0.22	15	4	15	26.66
28	<i>Momordica dioica</i> Roxb. ex Willd.	Kartule	Cucurbitaceae	Tubers extract used to cure tympany.(01)	0.07	5	1	5	20
29	<i>Morus alba</i> L.	Tuti	Moraceae	Leaves extract used to cure tympany.(02)	0.04	3	2	3	66.66
30	<i>Ricinus communis</i> L.	Erandi	Euphorbiaceae	Roots is given to treat gases/ tympany(01) Oil used to cure constipation.(02)	0.1	7	3	7	42.85
31	<i>Sapindus mukorossi</i> Gaertn.	Ritha	Sapindaceae	Seeds juice given in stomachache./Dysentry.(01) Fruit extract used to cure tympany.(01)	0.03	2	2	2	100
32	<i>Senna auriculata</i> (L.) Roxb.	Tarwad	Fabaceae	Leaves used in blotting/tympany(01)	0.01	1	1	1	100
33	<i>Tectona grandis</i> L.f.	Sag	Lamiaceae	Seeds extract used to cure tympany.(01)	0.08	6	1	6	16.66
34	<i>Terminalia chebula</i> Retz.	Balhirda	Combretaceae	Fruit power used in blotting/tympany(01)	0.01	1	1	1	100
35	<i>Thespesia populnea</i> (L.) Sol. ex Correa	Parosapimpal	Malvaceae	Leaves juice is recommended to cure dysentry.(01)	0.01	1	1	1	100
36	<i>Trachyspermum ammi</i> (L.) Sprague	Oaa	Apiaceae	Fruits extract used to cure tympany.(01) )	0.03	2	1	2	50
37	<i>Trichosanthes tricuspidata</i> Lour.	Gavlan, Gavin	Cucurbitaceae	Seeds given in Dysentry.(01) Fruit extract used to cure tympany.(01)	0.13	9	2	9	22.22
38	<i>Vitex negundo</i> L.	Nirgudi	Lamiaceae	Leaves Powder mix with black salt, is given to treat gases in stomach/tympany.(01)	0.04	3	1	3	33.33
39	<i>Withania somnifera</i> (L.) Dunal	Askand, Ashwagandha	Solanaceae	Leaves juice & buttermilk mixture is used to cure diarrhoea.(03) Leaves juice & buttermilk mixture is used to cure dysentry.(02)	0.13	9	5	9	22.22

Table 2: Informant Consensus Factor for different livestock diseases

Sr. No.	Ailment category	No. of Species used (nt)	Use Citations (nur)	ICF = $\frac{nur-nt}{nt-1}$
1	Deficiencies Diseases	10	70	0.87
2	Dermal diseases	22	40	0.85
3	Gastrointestinal disease	39	101	0.62
4	Ophthalmic disease	7	44	0.86
5	Parasitic disease	17	85	0.80
6	Reproductive disease	25	161	0.85
7	Respiratory disorder	6	7	0.16
8	Skeletomuscular disease	7	13	0.5
9	Zootoxins	4	20	0.84



**Conclusion**

The present ethno-medicinal study revealed that the local medicine-men has great knowledge of ethno-veterinary plants and their utilization for the treatment of gastrointestinal as well as various ailments. These people have gained this knowledge from their long-term experiences and practices and also from their ancestors. It was observed that the utilization of medicinal plant resources for the preparation of home remedies is still an accepted system of health care among most of the tribal communities of rural and remote areas. Therefore, forest department should provide suitable guidelines and training to the people regarding the identification, collection period, sustainable harvesting and conservation of medicinal plant parts. The consciousness camps should be held for traditional herbal healers and younger generation to practice and conserve these valuable medicinal resources. The reported information can be used to standardize active principles which can further lead to the development of more efficient veterinary medicines.

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**Conflict of Interest**

Authors have no conflict of interest

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