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An ethno-veterinary study on plants used for the treatment of livestock diseases in Genç (Bingöl-Turkey)

Ebru Yüce Babacan[a], Rıdvan Polat[b], Osman Güler[a], Ayşe Moyan[b], Mehmet Yavuz Paksoy[c] & Uğur Çakılcıoğlu[a,*]

[a]Munzur University, Pertek Sakine Genç Vocational School, Pertek, Tunceli 62500, Turkey

[b]Bingöl University, Faculty of Agriculture Department of Landscape Architecture, Bingöl 12000, Turkey

[c]Munzur University Faculty of Engineering, Department of Enviromental Engineering, Tunceli 62100, Turkey

E-mail: ucakilcioglu@yahoo.com

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There are a very limited number of studies on plants traditionally used in animal diseases in Turkey. As a result, valuable information is getting lost. Traditional plant use in Genç District (Turkey) was recorded by semi-structured interviews with breeders and shepherds. The collected information was subjected to quantitative analysis using the informant consensus factor. It was recorded that a total of 53 plants from 24 families were used in the traditional treatment of animal diseases. 8 of these plants are endemic plants with a narrow distribution area and were recorded for the first time by us. The breeders stated that they applied such plants to animals with peace in mind as these plants had been used for human treatment as well. This study is the first ethnoveterinary study conducted in the province. Phytochemical studies need to be carried out on medicinal plants used in livestock around Bingöl Province. We believe that the use of this preliminary information obtained from ethnoveterinary studies by researchers will contribute to the production of natural animal medicines.

Keywords: Bingöl, Ethno-veterinary, FIC, Genç, Medicinal plants, Traditional use, Turkey

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Plants have been of constant importance throughout human history. Before and after the written history, the medicinal use of plants was common. Although plants maintain their importance in medicine today, they also constitute practice systems that are passed down through generations and are constantly evolving[1]. Medicines produced from components obtained through laboratory studies with plants constitute approximately 25% of all medicines in the world[2].

The very center of ethnobotanical studies is devoted to the medicinal use of plants and various ethnoveterinary application studies in some countries. Ethnoveterinary Practice (EVP) addresses local practices, cultural heritage, methods used, and religious beliefs[3]. Many pet diseases are treated with ethnoveterinary practices. Ethnoveterinary medicine, which is a cultural heritage, has been acquired by different nations over the years and is transmitted orally through generations. This valuable cultural heritage is rapidly disappearing today[4]. Considering the cost and difficulties in obtaining synthetic drugs, the use of herbal treatment by indigenous peoples contributes to the field of veterinary medicine[5]. The interest of all people in natural products has increased. It is a fact that people's ethnoveterinary practices contribute significantly to the production of organic milk and meat products and our sustainable development[6].

In recent years, the traditional use of plants for animal diseases has been called EVP and has become widespread in many countries[7-15].

The flora of Turkey contains around 12,000 taxa and approximately 30% of the taxa are endemic. This high number of plants in Turkey constitutes a critical resource for obtaining new ethnobotanical information[16].

This study is the first ethnoveterinary study in the Eastern Anatolia Region (Turkey) in which statistical calculations were made using the informant consensus factor method on ethnoveterinary plants. It is important to record the traditional knowledge of the local people living in the Genç District because rapid urbanization and migration will lead to the loss of this valuable traditional knowledge. Therefore, this study aims to analyze and record the traditional knowledge

*Corresponding author

on animal diseases of the people living in the Genç District in the Eastern Anatolia Region (Turkey).

Materials and Methods

Study area

The Genç district (Fig. 1) is located in Eastern Anatolia Region (Bingöl-Turkey) and between the longitudes of 40°55'−80° 26' E, the latitudes of 38° 75'−29° 34' N in Irano Tranian phytogeography Region and appear in the B8 grid-square depending to the grid-system[17].

The total population of the Genç District, which is the largest district of Bingöl Province, is 35,267. A total of 18,885 of this population are located in the district center and 9,666 of them in the villages. Based on the characteristics of the continental climate in Bingöl Province, the difference between day and night as well as the hottest and the coldest month is high. The Bingöl Province, which has an ideal structure for forestry in terms of climate and land structure, is one of the provinces with the richest forest area in the Eastern Anatolia Region. The annual average temperature is 12.1°C. The annual amount of rainfall is 873.7 mm; the number of snowy days is 24.5 days, and the number of frosty days is 94.1 days. The area of the Genç District is 1.646 km². The district is surrounded by the central district of Bingöl Province and Murat River in the north; Diyarbakır Province in the south; Solhan District in the east and Elazığ Province in the west. The district center is established on a flat area on the riverside of the Murat River and has an altitude of 1.125 m. Agriculture and animal breeding is the source of livelihood in the region (https://Bingöl.ktb.gov.tr/TR-56989/ilin-cografi-konumu.html; http://www.Bingöl.gov.tr/genc).

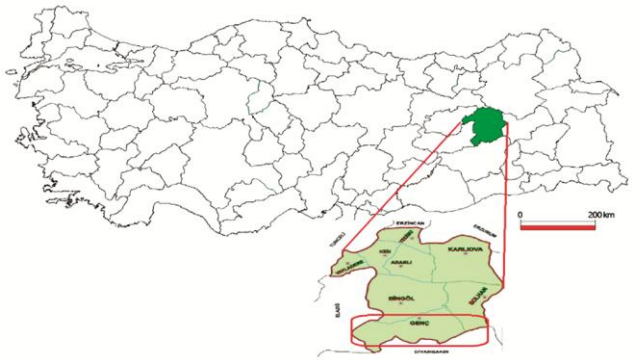

Fig. 1 — Study area

Interviews with native people

The local uses of plants, our cultural heritage, were recorded with a semi-structured questionnaire with 27 people (animal breeders, shepherds, and healers). In order to obtain detailed information about ethnoveterinary plants, the questions in Annexure 1 were asked during the interviews with people using or having knowledge of traditional ethnoveterinary medicines in pastures, animal farms, and village squares. Local people were asked to show the local plants they used for animal treatment. During the interviews, demographic characteristics of the people, local names of the plants, plant parts of use, preparation methods of plants, diseases of use, and method of use were recorded within the framework of ethical rules (Table 1). Permission was obtained from the informants for the photographs taken in the study area.

Table 1 — Plant species used in ethno-veterinary medicine

Family / Name of the plant	Voucher number / Endemsim (+)	Vernacular name(s)	Ethno-veterinary use	Part used	Mode of preparation/ application
Amaryllidaceae					
Allium cepa L.	UC-68	*Soğan*	Mastitis	Bulb	Boiled / compress
Anacardiaceae					
Rhus coriaria L.	UC-20	*Sumak*	Hoof-and-mouth disease	Seeds	Decoction / externally
Asparagaceae					
Ornithogalum narbonense L.	UC-82	*Zulk*	Abscess	Aerial parts	Boiled / compress
Asteraceae					
Achillea millefolium L.	UC-116	*Gihaye çexer*	Milk enhancer	Whole plant	Decoction /beverage
Artemisia absinthium L.	UC-7	*Gezı*	Wounds	Aerial parts	Decoction / compress
Anthemis kotschyana Boiss.	UC-130	*Papatya*	Stomach and abdominal pains	Capitulum	Infusion/ beverage
Anthemis cotula L.	UC-123	*Papatya, Elikfatık*	Stomach and abdominal pains	Capitulum	Infusion/ beverage
Centaurea bingoelensis Behçet & İlçim	UC-3 /+	*Peyganberdikeni*	Antiseptic	Whole plant	Decoction / externally

(*Contd.*)

Table 1 — Plant species used in ethno-veterinary medicine (*Contd*.)

Family / Name of the plant	Voucher number / Endemsim (+)	Vernacular name(s)	Ethno-veterinary use	Part used	Mode of preparation/ application
Gundelia tournefortii L.	UC-80	*Kenger, Kinger*	Wounds	Latex	Externally
Tanacetum kotschyi (Boiss.) Grierson	UC-84	*Tatasıl*	Intestinal parasite	Aerial parts	Infusion/ beverage
Tripleurospermum parviflorum (Willd.) Pobed.	UC-4	*Beybunik*	Facilitating childbirth	Aerial parts	Infusion/ beverage
Boraginaceae					
Anchusa azurea Mill.	U-C-103	*Gelozon*	Diaphoretic, stomach-ache	Whole plant	Decoction / beverage
Anchusa leptophylla subsp. *tomentosa* (Boiss.) D.F.Chamb.	UC-18 /+	*Gelzun*	Snake bites	Leaves	Boiled / compress
Brassicaceae					
Nasturtium officinale R.Br.	UC-108	*Tujık*	Diarrhea	Leaves	Infusion / beverage
Caprifoliaceae					
Sambucus nigra L.	UC-157	*Patpatik*	For placenta expulsion	Leaves	Infusion / beverage
Caryophyllaceae					
Cerastium armeniacum Gren.	UC-160 /+	*Boynuzotu*	Scabies	Aerial parts	Infusion / externally
Convolvulaceae					
Convolvulus galaticus Rost. ex Choisy	UC-51	*Sarmaşık*	Purgative	Leaves	Decoction / beverage
Euphorbiaceae					
Euphorbia orientalis L.	UC-124	*Sütleğen*	Wounds	Latex	Externally
Cucurbitaceae					
Cucurbita moschata Duchesne	UC-145	*Bal kabağı*	Internal parasite	Seeds	Feed additive / feed
Fabaceae					
Astracantha gummifera (Labill.) Podlech	UC-54	*Geven Şirık*	Scabies	Aerial parts	Decoction / externally
Glycyrrhiza glabra L.	UC-72	*Biyan, Meyan*	Postpartum fatigue	Roots	Decoction / beverage
Lotus gebelia Vent.	UC-34	*Gazalboynuzu*	Milk enhancer	Whole plant	Feed additive / feed
Trifolium pratense L.	UC-57	*Argud, Nefıl*	Milk enhancer	Aerial parts	Feed additive / feed
Vicia cracca L.	UC-23	*Fig*	Vitaminizing	Whole plant	Feed additive / feed
Fagaceae					
Quercus petraea subsp. pinnatiloba (K.Koch) Menitsky	UC-171 /+	*Mazımeşesi*	Fever	Acorn	Decoction / beverage
Hypericaceae					
Hypericum scabrum L.	UC-131	*Kantarıon*	Irritation, eye diseases	Aerial parts	Infusion / externally
Juglandaceae					
Juglans regia L.	UC-71	*Goz*	Scabies	Leaves	Infusion + olive oil / externally
Lamiaceae					
Mentha spicata L.	UC-111	*Pune*	Abdominal pains, diarrhea	Leaves	Infusion / beverage
Nepeta trachonitica Post	UC-74	*Çayepune*	Diarrhea	Aerial parts	Decoction/ beverage
Origanum vulgare subsp. *gracile* (K.Koch) Ietsw.	UC-167	*Onıx, Anıx*	Inflammations	Leaves	Decoction / compress
Phlomis kurdica Rech.f.	UC-10	*Gubel*	Scabies	Aerial parts	Decoction/ externally
Salvia multicaulis Vahl	UC-159	*Yağlambaç*	Ocular diseases	Flowers	Externally
Stachys lavandulifolia Vahl	UC-29	*Dağ Çayı*	Scabies	Aerial parts	Decoction/ externally
Teucrium orientale subsp. *glabrescens* (Hausskn. ex Bornm.) Rech.f.	UC-164	*Çaye çiya*	Getter	Aerial parts	Decoction/ beverage
Thymus fallax Fisch. & C.A.Mey.	UC-86	*Catri*	Mastitis	Leaves	Infusion/ beverage
Malvaceae					
Malva neglecta Wallr.	UC-69	*Düelik, Ebegümeci*	Breast edema	Leaves	Boiled / compress

(*Contd*.)

Table 1 — Plant species used in ethno-veterinary medicine (*Contd*.)

Family / Name of the plant	Voucher number / Endemsim (+)	Vernacular name(s)	Ethno-veterinary use	Part used	Mode of preparation/ application
Moraceae					
Morus nigra L.	UC-120	*Tui, Karadut*	Oral wounds	Fruits	Eaten raw and externally
Ficus carica L.	UC-140	*İncir*	Breast wart	Latex	Externally
Plantaginaceae					
Globularia trichosantha Fisch. & C.A.Mey.	UC-99	*Tüylüçiçek*	Diarrhea	Aerial parts	Infusion / beverage
Plantago lanceolata L.	UC-153	*Pelonbaş*	Abscess	Aerial parts	Boiled / compress
Plantago major L.	UC-115	*Omınwaş*	Anti-inflammatory	Leaves	Boiled / compress
Poaceae					
Zea mays L	UC-1	*Mısır*	Milk enhancer	Seeds	Feed additive / feed
Polygonaceae					
Polygonum cognatum Meissn.	UC-28	*Nonmirçıkon*	Indigestion	Aerial parts	Eaten raw
Rumex acetosella L.	UC-91	*Tırşık*	Indigestion	Leaves	Feed additive / feed
Rosaceae					
Cotoneaster nummularius Fisch. & C.A.Mey.	UC-17	*Say mirçık*	Diarrhea	Fruits	Eaten raw
Crataegus orientalis Pall. ex M.Bieb.	UC-13	*Sinz, Sez*	Roborant	Fruits	Feed additive / feed
Crataegus orientalis subsp. *szovitsii* (Pojark.) K.I.Chr.	UC-174	*Sinz, Sez*	Roborant	Fruits	Feed additive / feed
Prunus armeniaca L.	UC-106	*Kagsı*	Constipation	Fruits	Eaten raw
Pyrus communis L.	UC-165	*Querç*	Constipation	Fruits	Eaten raw
Rosa canina L.	UC-33	*Sırgul, Kuşburnu*	Antiseptic, cough	Flowers, fruits	Boiled / compress
Rubus sanctus Schreb.	UC-180	*Dırık, Böğürtlen*	Roborant	Fruits	Feed additive / feed
Salicaceae					
Salix alba L.	UC-32	*Valer*	Scabies	Leaves	Decoction/ externally
Urticaceae					
Urtica dioica L.	UC-5	*Gerzunek, Gezok, Isırgan*	Infertility, butterfly disease	Leaves	Infusion/ beverage

Plant materials

This study was carried out in the Genç District and its villages between 2020 and 2021. 56 plant taxa were collected from the field between these dates. The plants were transformed into herbarium material and identified from the works called Flora of Turkey[17-19]. The herbs are preserved in Munzur University and Bingöl University. Permissions required for the study were obtained from the relevant authorities.

Data analysis

The information we obtained as a result of our interviews was analyzed with the FIC quantitative method (Table 2). FIC was calculated for each group to determine the agreement of the participant on the reported treatment. FIC was calculated by following formula (FIC= Nur-Nt / Nur-1) where ‘’Nur’’ is the number of plant taxa use citations in each group and, ‘’Nt’’ is the number of plant used.

Result and Discussion

It has been observed that animal breeders and shepherds in Genç District apply the treatment method for some diseases with their ethnoveterinary knowledge. 27 people were interviewed for our ethnoveterinary study in the Genç District. The average age of the people providing information was 48 and the interviews were held with 6 women and 21 men.

Table 2 — Categories of medical and FIC(ICF) for ethno-veterinary

Medical categories	Number of species	Number of use- reports	Informants′ consensus factor (FIC)
Parasitic diseases	8	16	0,53
Digestive diseases	10	25	0,62
Milk production	4	8	0,57
Wounds	4	12	0,72
Inflammations and apse	5	8	0,43
Respiratory tract diseases	2	3	0,50
Postpartum	2	4	0,67
Breast diseases	4	9	0,63
Weakness	5	6	0,20
Eye diseases	2	3	0,50

People with knowledge about ethnoveterinary medicine are usually old people who used to breed

animals or people who breed or care for animals today. Elderly people living in the region stated that they obtained this information about traditional treatment from previous generations or through trials.

In the study, ethnoveterinary uses of a total of 53 species from 24 families were determined for the treatment of various diseases (external parasites, gastrointestinal diseases, foot-and-mouth disease, mange, mastitis, poisoning, and wounds) of horses, donkeys, dogs, sheep, goats and cattle in many farms. All these ethnoveterinary plant species we have obtained have been seen to be used for one or more than one animal disease (Table 1).

The scientific and local names, plant families, plant parts of use, and preparation methods of 53 plants traditionally used for ethnoveterinary purposes are given in (Table 1). The most common families in terms of the number of species in the research field are Astareceae (8 plants), Lamiaceae (8 plants), Rosaceae (7 plants), Fabaceae (5 plants), Plantaginaceae (3 plants), and other families (Fig. 2). The most commonly used plants are *Achillea millefolium* L., *Allium cepa* L., *Anchusa azurea* Mill., *Hypericum scabrum* L. *Mentha spicata* L., *Plantago lanceolata* L., *Rosa canina* L. and *Urtica dioica* L.

The plant parts used for plant-derived medicines are aerial parts (28.3%), leaves (24.5%), fruits (15.1%), whole plant (9.4%), seeds (5.7%), capitulum, flowers, and latex (3.8%), acorn, bulb and roots, (1.9%) respectively (Fig. 3). According to these results, whole plants, leaves and fruits are the parts more frequently used in medicine preparation. It is possible to come across similar results upon the examinations of ethnoveterinary and ethnobotanical studies in Turkey[20,21]. The use of leaves and fruits for ethnoveterinary purposes in the region does not harm the harvested plant. These are natural edible resources and do not lead to the extinction of the plant. In some countries of Africa, plant bark, resin and mostly root are used for ethnoveterinary purposes[22,23]. In addition, it has been seen that the breeders or shepherds prepare the plants for ethnoveterinary purposes by applying several methods. For example, infusion, decoction, boiling, direct addition to feed, soaking in olive oil, raw feeding and external use. The breeders and shepherds have made the plants ready for use with various methods. They sometimes use one species and sometimes several plants are used together. The information we obtained in our study indicated that the leaves of the plants are more commonly used for the treatment of diseases. In similar studies, it was observed that the use of plant leaves for human and animal diseases is frequent[24-28].

A total of 53 plants are used for medicinal purposes by breeders in and around the Genç District. Generally, a disease is attempted to be treated by using one plant taxon. In the ethnoveterinary study conducted in Giresun Province, mixtures of plants are prepared in order to increase the efficacy of the treatment[7]. The most common drug preparation method is decoction and 15 uses have been recorded. The decoction preparation method is used as the most common method in many areas of the world[29-34]. The decoction is a general method of use in medicines for ethnoveterinary use and carelessly herbarized plants and plant parts are used[7]. Other preparation methods are as follows, respectively: infusion (13 of use-reports), feed additive (9 uses), boiled (7 uses) and eaten raw (5 uses). The most common routes of application are external (23 of use-reports), beverage (17 of use-reports), and raw, or added into feed (14 of use-reports).

On examination of some disease categories with ethnoveterinary plant use, the data in Table 2 were obtained. Here, the corresponding FIC values for each disease category were determined between 0.20 (weakness) and 0.72 (wounds). Our study is the first ethnoveterinary study in the Eastern Anatolia region in which FIC statistical values were calculated. Considering the FIC values obtained in a study conducted in China; 0.91 (respiratory disorders) was

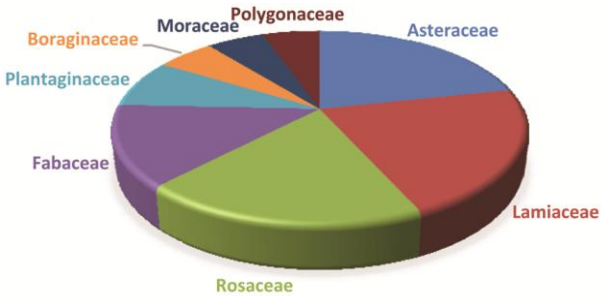

Fig. 2 — Most representative families

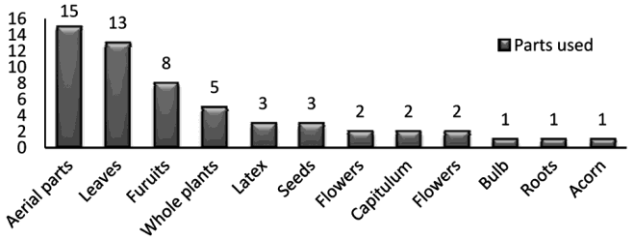

Fig. 3 — The number of the plant parts that are used

detected as the highest and 0.78 (parasitic diseases) as the lowest value[35].

It has been observed in the Genç District that young animals get sick in certain months of the year. Diseases related to eating fresh feed increase with the growth of plants in spring and summer and certain diseases increase due to the transition to ready-made feeds and cold weather in autumn and winter. Generally, various wounds and skin problems, postpartum problems and stomach and intestinal problems are seen.

The people in the region make use of the plants *Crataegus orientalis* Pall. ex M.Bieb., *Crataegus orientalis* subsp. *szovitsii* (Pojark.) K.I.Chr., *Rubus sanctus* Schreb., *Vicia cracca* L. in order to strengthen animals against seasonal changes and postpartum weakening. *C. orientalis*, *C. orientalis* subsp. *szovitsii* and *R. sanctus* are wild fruits from the family Rosaceae. Their uses as wild fruits by humans are also seen in the literature[36-38].

Convolvulus galaticus Rost. ex Choisy, *Cotoneaster nummularius* Fisch. & C.A.Mey., *Globularia trichosantha* Fisch. & C.A.Mey., *Mentha spicata* L., *Nepeta trachonitica* Post, *Polygonum cognatum* Meissn., *Rumex acetosella* L., *Prunus armeniaca* L., *Pyrus communis* L. are used for stomach and intestinal diseases in the region. These plants are used for similar diseases for animals and humans in different regions[39-41]. *Globularia trichosantha* Fisch. & C.A.Mey. and *Nepeta trachonitica* Post plants' aerial parts are used for diarrhoea (Fig. 4 a&b). The therapeutic use of these plants was recorded for the first time. In addition, it has been observed that the animals excessively consume the dried *Lotus gebelia* Went. plant have exhibited symptoms of poisoning (Fig. 4c).

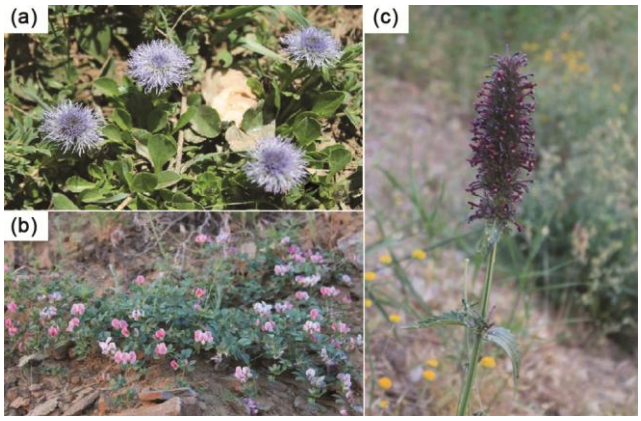

Fig. 4 — Some plants used in the region

Allium cepa is the most commonly used plant for mastitis in animals. *A. cepa* is boiled in hot water and boiled onion is applied to the breast with mastitis by compressing. In addition, the infusion of *Thymus fallax* leaves is used for mastitis as a drink for animals.

Laboratory studies on plants are carried out intensively all over the world. Within the scope of these studies, many plants traditionally used for therapeutic purposes in the Genç District were also studied. *Plantago major* L. and *Plantago lanceolata* L. are used by the people in the region for abscess and inflammation and have concluded with good results. It was reported in the studies that *P. lanceolata* exhibited painkiller and anti-inflammatory activity[42]. *Hypericum scabrum* L. is used in ethnoveterinary medicine for the treatment of irritation and eye diseases. It was reported that *Hypericum* species exhibited antibacterial and antimicrobial activities[43]. *Anthemis* species are used for wound healing and as a galactagogue. *Anthemis* species was reported to exhibit antimicrobial activities[44]. Similarly, the decoction of *Artemisia* species was used by compressing *as a wound healer*. *Artemisia* species was reported to exhibit antimicrobial activities[45].

Anchusa leptophylla subsp. *tomentosa* (Boiss.) D.F.Chamb. plant leaves are boiled in water and used as a compress against snake bites. The decoction of the plant *Centaurea bingoelensis* Behçet & İlçim is used as an antiseptic. Infusion of the plant *Cerastium armeniacum* Gren. is used externally for mange. Decoction of *Quercus petraea* subsp. *pinnatiloba* (K.Koch) Menitsky oak is used to reduce high fever. These are endemic plants and their use was recorded for the first time.

Conclusions

In the Genç District, which is located within the borders of Bingöl Province in the Eastern Anatolia Region, the local people, who make a large part of their livelihood with animal breeding, use 53 plants grown in the natural environment for ethnoveterinary purposes. It has been found in the literature that most of these plants are used for humans as well. It has become traditional to treat sick animals with plants. Veterinarians are called for animals that they cannot treat with plants in the early stages of the disease. We think that if the plants used in the treatment of animal diseases are used for the same diseases in different regions, they can be a source for herbal medicine researchers. Ethnoveterinary knowledge has begun to

disappear with the migration from villages to cities and the decrease in animal breeding in villages. It is important to conduct studies on regions where there is no study and record the same. We believe that such studies will contribute to the development of herbal medicines and studies in different fields.

Annexure 1

1. Name and surname of the interviewee
2. Date of birth and gender of the interviewee
3. Place and period of residence of the interviewee
4. Period of handling animal breeding of the interviewee
5. Local names of the plants used for ethnoveterinary purposes
6. For which diseases do you use the plants?
7. Which parts of the plant do you use? (bark, root, flower, leaves, fruit, etc.)
8. What is the method for preparing the plant?
9. What is the method of use and dosage of ethnoveterinary plants?

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Conflict of Interest

The authors declare that they have no conflict of interest.

Authors' Contributions

UC and RP designed the study. EB, UC, OG, RP, AM conducted the field work. UC, EB and MP analyzed the data and provided comments on the study. UC drafted the article and provided fnal version topublish. All authors read and approved the final article.

References

1 Heinrich M, Ethnopharmacology in the 21st century - grand challenges, *Front Pharmacol,* 1 (2010) 1-3. doi: 10.3389/ fphar.2010.00008.

2 McCorkle M C, An introduction to ethnoveterinary research and development, *J Ethnobiol,* 6 (1986) 129-149.

3 Vitalini S, Tomè F & Fico G, Traditional uses of medicinal plants in Valvestino (Italy), *J Ethnopharmacol,* 121 (2009) 106-116.

4 Mathias E, Ethnoveterinary medicine: harnessing its potential, *Vet Bull,* 74 (8) (2004) 27-37.

5 Monteiro M V B, Bevilaqua C M L, Palha M D D C, Braga R R, Schwanke K *et al*., Ethnoveterinary knowledge of the inhabitants of Marajó Island, Eastern Amazonia, Brazil, *Acta Amazon,* 41 (2) (2011) 233-242.

6 Lans C, Turner N, Kahan T, Brauer G & Boepple W, Ethnoveterinary medicines used for ruminants in British Columbia, Canada, *J Ethnobiol Ethnomed,* 3 (11) (2007) 1-22.

7 Güler O, Polat R, Karakose M, Cakılcıoğlu U & Akbulut S, An ethnoveterinary study on plants used for the treatment of livestock diseases in the province of Giresun (Turkey), *South Afr J Bot,* 142 (2021) 53-62. doi: 10.1016/j.sajb.2021.06.003

8 González J A, García-Barriuso M & Amich F, Ethnoveterinary medicine in the Arribes del Duero, Western Spain, *Vet Res Comm,* 35 (2011) 283-310.

9 Benitez G, Gonzalez-Tajero M & Molero-Mesa J, Knowledge of ethnoveterinary medicine in the Province of Granada, Andalusia, Spain, *J Ethnopharmacol,* 139 (2012) 429-439.

10 Bartha S G, Quave C L, Balogh L & Papp N, Ethnoveterinary practices of Covasna county, Transylvania, Romania, *J Ethnobiol Ethnomed,* (2015) 11-35.

11 Mayer M, Zbinden M, Vogl C R, Ivemeyer S, Meier B, *et al*., Swiss ethnoveterinary knowledge on medicinal plants – a within-country comparison of Italian speaking regions with north-western German speaking regions, *J Ethnobiol Ethnomed,* 13 (2017) 1.

12 McGaw L J, Famuyide I M, Khunoana E T & Aremu A O, Ethnoveterinary botanical medicine in South Africa: A review of research from the last decade (2009 to 2019), *J Ethnopharmacol,* 257 (2020) 112864.

13 Khunoana E T, Madikizela B, Erhabor J O, Nkadimeng S M, Arnot L F, *et al*., A survey of plants used to treat livestock diseases in the Mnisi community, Mpumalanga, South Africa, and investigation of their antimicrobial activity, *South Afr J Bot,* 126 (2019) 21-29.

14 Nimbalkar S D, Patil D S & Deo A D, Ethnoveterinary practices (EVP) for control of ectoparasite in livestock, *Indian J Tradit Know,* 19 (2) (2020) 401-405.

15 Sikarwar R L S & Tiwari A P, A review of plants used in ethnoveterinary medicine in Central India, *Indian J Tradit Know,* 19 (3) (2020) 617-634.

16 Dogan Y, Nedelcheva A, Luczaj L, Dragulescu C, Stefkov G, *et al.*, Of the importance of a leaf: the ethnobotany of sarma in Turkey and the Balkans, *J Ethnobiol Ethnomed,* 11 (2015) 26.

17 Davis P H, *Flora of Turkey and the East Aegean Islands*, Vol.1-9, (Edinburgh: Edinburgh University Press), 1965–1985.

18 Davis P H, Mill R R & Tan K, *Flora of Turkey and the East Aegean Islands*, Vol.10, (Edinburgh: Edinburgh University Press), 1988.

19 Güner A, Özhatay N, Ekim T & Başer K H C, *Flora of Turkey and the East Aegean Islands*, Vol.11, (Edinburgh: Edinburgh University Press), 2000.

20 Özen R & Doğan G, Herbal medicine raw materials used as part of the veterinary medical folklore in the Elazığ province and its vicinity, *Lokman Hekim Der*, 7 (2017) 166-177.

21 Yeşil Y & Akalın E, Fodder, veterinary and miscellaneous useful plants in Kürecik (Malatya- Eastern Turkey), *J Fac Pharm Istanbul,* 46 (1) (2016) 23-37.

22 Yigezu Y, Demissew B H & Yenet W, Ethnoveterinary medicines in four districts of Jimma zone, Ethiopia: cross sectional survey for plant species and mode of use, *BMC Vet Res,* 10 (2014) 76.

23 Yinegar H, Kelbessa E, Bekele T & Lulekal E, Ethnoveterinary medicinal plants in Bale Mountains National Park, Ethiopia, *J Ethnopharmacol,* 112 (2007) 55-70. 10.1016/j.jep.2007.02.001.

24 Eraslan Z B & Kültür Ş, Ethnoveterinary medicine in Turkey: a comprehensive review, *Turkish J Vet Animal Sci,* 43 (2019) 555-582.

25 Sinmez Ç Ç, Aslım G & Yaşar A, An ethnoveterinary study on plants used in the treatment of dermatological diseases in Central Anatolia, Turkey, *J Compl Med Res,* 8 (2) (2018) 71-84.

26 Cakilcioglu U & Turkoglu I, Plants used for hemorrhoid treatment in Elazığ central district, *Acta Hortic,* 826 (2009) 89-96.

27 Nadiroğlu M, Behçet L & Çakılcıoğlu U, An ethnobotanical survey of medicinal plants in Karlıova (Bingöl-Turkey), *Indian J Tradit Know,* 18 (1) (2019) 76-87.

28 Yerebasan N, Kırçıl E, Yıldırım M S, Çakılcıoğlu A, Deniz V & Demirkıran D, A review of the traditional plant use culture in Elazığ (Turkey), *Int J Nat Life Sci*, 5 (2021) 1-10.

29 Kumar G C, Jyrwa J D, Jabin G, Sharma L K, Thakur M & Chandra K, Ethno-medicinal use of monitor lizard *Varanus bengalensis* (Daudin, 1802) by the 'Adi' tribe at East Siang, Arunachal Pradesh, *Indian J Tradit Know,* 20 (3) (2021) 749-753.

30 Kale R B, Gadge S S, Jayaswall K, Patole A O, Mahajan V, *et al.*, Validation of ethno-veterinary medicinal practices of onion (*Allium cepa* L.), *Indian J Tradit Know,* 20 (3) (2021) 775-783.

31 Cakilcioglu U & Turkoglu I, Plants used to lower blood sugar in Elazıg Central District, *Acta Horticult,* 826 (2009) 97-104.

32 Yalçın S, Akan H & Çakılcıoğlu U, Suruç'ta (Şanlıurfa-Türkiye) bazı şifalı bitkilerin geleneksel kullanımları, *Türk Doğa Fen Derg,* 10 (1) 236-244.

33 Yalçın S, Akan H & Çakılcıoğlu U, Suruç ilçesindeki (Şanlıurfa-Türkiye) aktarlarda satılan şifalı bitkiler. *Int J Nat Life Sci,* 5 (1) (2021) 40-51. doi: 10.47947/ ijnls.ijnls.932374

34 Çakılcıoğlu U, Traditional foods production and medicinal utilization of *Gundelia* L. species in Tunceli (Turkey), *Indian J Tradit Know,* 19 (4) (2020) 714-718.

35 Xiong Y & Long C, An ethnoveterinary study on medicinal plants used by the Buyi people in Southwest Guizhou, China, *J Ethnobiol Ethnomed,* 16 (2020) 46.

36 Güneş S, Savran A, Paksoy M Y & Çakılcıoğlu U, Survey of wild food plants for human consumption in Karaisalı (Adana-Turkey), *Indian J Tradit Know,* 17 (2) (2018) 290-298.

37 Polat R, Güner B, Yüce-Babacan E & Çakılcıoğlu U, Survey of wild food plants for human consumption in Bingöl (Turkey), *Indian J Tradit Know,* 16 (3) (2017) 378-384.

38 Kawarty A M A M A, Behçet L & Çakılcıoğlu U, Ballakayati'nin (Erbil - Kuzey Irak) yabani gıda bitkileri hakkında geleneksel bilgiler, *Afyon Kocatepe Üniv Fen Müh Bil Der,* 21 (2021) 520-531. doi: 10.35414/akufemubid.890018.

39 Polat R & Satıl F, An ethnobotanical survey of medicinal plants in Edremit Gulf (Balıkesir-Turkey), *J Ethnopharmacol,* 139 (2012) 626-641.

40 Kawarty A M A M A, Behçet L & Çakılcıoğlu U, An ethnobotanical survey of medicinal plants in Ballakayati (Erbil, North Iraq), *Turk J Bot,* 44 (2020) 345-357.

41 Polat R, Cakilcioglu U, Kaltalioğlu K, Ulusan M D & Türkmen Z, An ethnobotanical study on medicinal plants in Espiye and its surrounding (Giresun-Turkey), *J Ethnopharmacol,* 163 (2015) 1-11.

42 Guillen M E N, Emim J A S, Souccar C & Lapa A J, Analgesic and anti-inflammatory activities of the aqueous extract of *Plantago major* L., *Pharmaceut Biol,* 35 (1997) 99-104.

43 Reichling J, Weseler A & Saller R, A current review of the antimicrobial activity of *Hypericum perforatum* L., *Pharmacopsychiatry,* 34 (2001) 116-118.

44 Quarenghi M V, Tereschuk M L, Baigori M D & Abdala L R, Antimicrobial activity of flowers from *Anthemis cotula*, *Fitoterapia,* 71 (2000) 710-712

45 Ahmad F, Khan R A & Rasheed S, Study of analgesic and anti-inflammatory activity from plant extracts of *Lactuca scariola* and *Artemisia absinthium*, *Med J Islamic World Acad Sci*, 5 (2) (1992) 111-114.