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# AN ETHNOVETERINARY STUDY ON THERAPEUTIC PLANTS USED FOR LIVESTOCK AILMENTS IN THE PROVINCE OF TRABZON (TURKEY)

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## ABSTRACT

The study aim is to determine the plant species used in ethnoveterinary medicine in Trabzon province (Turkey). The collected data were analyzed using informant consensus factor (ICF) and fidelity level (FL), which inform from quantitative indices. A total of 47 plants belonging to 33 families were found used in ethnoveterinary. The most dominant families were Asteraceae, Rosaceae, Apiaceae, and Fabaceae. The highest ICF was recorded for respiratory tract ailments and urinary tract ailments (1.0) followed by poisonings (0.93) and wounds (0.83). The high FL values were *Ficus carica* (92%) for warts, *Vicia cracca* (87%) for milk production, and *Plantago major* (83%) for wounds. Ethnoveterinary uses of *Valeriana alliariifolia* and *Pennisetum glaucum* were recorded for the first time in Turkey.

**KEYWORDS**:
Ethnoveterinary, medicinal plants, informant consensus factor, fidelity level, Trabzon

## INTRODUCTION

Traditional treatment practices related to animal health are called "Ethnoveterinary Medicine (EVM)". Animal breeders benefit from plants for livestock productivity, high yields, and first treatment against ailments [1]. Ethnoveterinary practice, unlike medical veterinary practices, is practiced and developed by local animal owners and is often transferred on by word of mouth [2]. The high cost of veterinary services and medicines make traditional treatment practices attractive, especially for livestock owners [3]. According to the World Health Organization (WHO), approximately 80% of people in third world rely on traditional remedies for the treatment of some ailments that affect their animals [4].

Ethnoveterinary practices are closely related to biological diversity, cultural and sociological structure. For this reason, it may vary from country to country as well as between regions within the country [5]. Migration, population growth, technological developments are the biggest threats to forgetting this traditional knowledge. Therefore, it is very significant to record and disseminate local information. In recent years, research on ethnoveterinary practices has also increased in developed countries [6-10].

There are very significant studies in terms of ethnobotanical studies in Turkey [11, 12]. However, studies on ethnoveterinary plants used in Turkey are limited [13-16].

Turkey, which has a flora number approaching 12000 [17] and has hosted many civilizations [18], is an important source region for ethnoveterinary studies.

The study aims to determine the plant species used in ethnoveterinary knowledge of the local people in Trabzon (Turkey).

## MATERIALS AND METHODS

**Study area.** Trabzon province is located in the Eastern Black Sea Region of Turkey (Figure 1). It is adjacent to the Black Sea in the north, Bayburt and Gümüşhane in the south, Rize in the east and Giresun in the west, and it is located between 40° 33' and 41° 07' northern latitudes and 39° 07' and 40° 30' east longitudes. Trabzon is located in the Euro-Siberian phyto-geographical region and the A7 and A8 squares according to the grid system by Davis. It has an important plant diversity with approximately 1400 plant taxa, 127 of which are endemic [19-21]. The foundation of the city dates back to 400 BC [22] and is one of the most important ports of the historical silk road [23]. The majority of the population lives on agriculture, fishing, hunting, animal husbandry, and forestry. The main agricultural products are tea, potatoes, corn, hazelnuts, tobacco, wheat, and beans. Trabzon's climatic conditions are very suitable for animal husbandry. Cattle, sheep, hair goats, and poultry are fed. Beekeeping has been developing in recent years [24].

**Data collection.** This study was carried out in the villages and highlands of Trabzon province during 2019-2020. Semi-structured interviews were conducted with 50 people, all of whom were men. Informants were chosen among the shepherds and

animal breeders living in the region. A questionnaire was administered to the informants through face-to-face interviews. In the survey, information about the demographic characteristics of the people, the traditional treatment methods related to the health of their animals and the plants they use, and the parts of the plants used were compiled. In addition, they were asked about the fodder plants they prefer to increase the product yield (milk, oil, meat, etc.) of their animals. Prior Informed Consent (PIC) was taken orally before starting each interview. Ethical guidelines followed the Code of Ethics of the International Society for Ethnobiology [25]. Plant species were identified and named according to World Flora Online [26] and the Flora of Turkey by the author [19-21].

**Data analysis.** Ethnoveterinary information gathered from one-to-one interviews with shepherds and local animal breeders were investigated by applying quantitative methods, the informant consensus factor (ICF) [27], and fidelity level (FL) [28]. The ICF was calculated for each ailment group to determine the informants' agreement on the reported treatment. The ICF formula was (1):

$$ICF = \frac{Nur-Nt}{Nur-1} \quad (1)$$

Nur: The number of citations in each ailment group.

Nt: The number of species used.

Fidelity level (FL) refers to the specificity of the plant species of choice for the ailments most frequently reported by informants. The FL formula was (2):

$$FL(\%) = \frac{Ip}{Iu} \times 100 \quad (2)$$

Ip: The number of informants that suggested the use of a plant for a particular ailment.

Iu: The total number of informants who mentioned that a species is used to treat any ailment.




**FIGURE 1**
**Geographical location of Trabzon province**

**TABLE 1**
**Ethnoveterinary uses of plant taxa in Trabzon (Turkey)**

| Scientific name | Family | Vernacular name | Parts used | Ethnoveterinary practices/uses | Ailments/therapeutic effect |
|---|---|---|---|---|---|
| *Sambucus ebulus* L. | Adoxaceae | Yiğidin | Leaves | Fresh | External parasites (The leaves are applied to the skin externally against flies.) |
| *Allium cepa* L. | Amaryllidaceae | Soğan | Bulbs | Crushed (with olive oil) | Skin inflammation (The heated bulbs are mixed with olive oil. It is applied externally to wounds.) |
| *Ferula szowitziana* DC. | Apiaeae | Kasnı | Roots | Decoction | Disinfectant, wounds (The decoction prepared from roots is used externally for skin and wound cleaning.) |
| *Heracleum apiifolium* Boiss. | Apiaceae | Kamşan, Çağan | Aerial parts | Decoction | Disinfectant, wounds (The decoction prepared from roots is used externally for skin and wound cleaning.) |
| *Sanicula europaea* L. | Apiaceae | Kadra, Tatahan çayırı | Aerial parts | Dried | Food supplement (The dried aerial parts are ground and given to sick chicks as supplementary food.) |
| *Achillea millefolium* L. | Asteraceae | Civanperçemi | Aerial parts | Fresh | Disinfectant (The aerial parts are applied to the skin externally against parasites.) |
| *Lactuca alpina* (L.) A.Gray | Asteraceae | Sütliga | Aerial parts | Fresh (Fodder) | To increase milk production |
| *Lactuca racemosa* Willd. | Asteraceae | Yaban marulu | Aerial parts | Fresh (Fodder) | To increase milk production |
| *Petasites albus* (L.) Gaertn. | Asteraceae | Galdirik | Leaves | Fresh (Fodder) | To increase milk production |
| *Telekia speciosa* (Schreb.) Baumg. | Asteraceae | Andız otu | Aerial parts | Fresh (Fodder) | To increase milk production |
| *Taraxacum serotinum* (Waldst. & Kit.) Poir. | Asteraceae | Sütlü ot | Aerial parts | Dried (Fodder) | To increase milk production |
| *Alnus glutinosa* subsp. *barbata* (C.A.Mey.) Yalt. | Betulaceae | Kızılağaç | Leaves | Fresh (Fodder) | To increase milk production |
| *Valeriana alliariifolia* Vahl | Caprifoliaceae | Kediotu | Roots | Decoction | Disinfectant (The decoction prepared from roots is applied to the skin externally against parasites and lice.) |
| *Gypsophila tenuifolia* M.Bieb. | Caryophyllaceae | Çöven | Aerial parts | Infusion | Internal parasites (The infusion prepared from aerial parts is given to animals internally against stomach and intestinal parasites.) |
| *Colchicum speciosum* Steven | Colchicaceae | Çumak, Zumak | Seeds | Crushed | Wounds (The seeds are crushed and rubbed into wounds on the feet and tails of sheep.) |

| | | | | | |
|---|---|---|---|---|---|
| *Calystegia silvatica* (Kit.) Griseb. | Convolvulaceae | Bürük | Aerial parts | Fresh (Fodder) | To increase milk production |
| *Cucurbita pepo* L. | Cucurbitaceae | Kabak | Fruits | Fresh | Diarrhea (Cucurbita is fed to animals in small pieces.) |
| *Dryopteris filix-mas* (L.) Schott. | Dryopteridaceae | Eğrelti | Leaves, rhizomes | Decoction | Stomachache, internal parasites (The decoction prepared in leaves and rhizomes is given to the animals internally against stomachache, and as a wormer and teniafuge.) |
| *Equisetum arvense* L. | Equisetaceae | Dorukotu | Aerial parts | Decoction | Urinary tract ailments (The decoction prepared in aerial parts is given to the animals internally in urinary tract infections and bloody urine cases.) |
| *Trifolium elongatum* Willd. | Fabaceae | Yonca | Aerial parts | Fresh (Fodder) | To increase milk production |
| *Trifolium pratense* L. | Fabaceae | Çayırotu | Aerial parts | Fresh (Fodder), decoction | To increase milk production (The fresh aerial parts are fed to animals as fodder.) Poisoning cases (The decoction prepared in aerial parts is given to the animals for several days.) |
| *Vicia cracca* L. | Fabaceae | Fiğ | Aerial parts | Fresh (Fodder) | To increase milk production |
| *Quercus petraea* subsp. *iberica* (Steven ex M.Bieb.) Krassiln. | Fagaceae | Pelit | Leaves, fruits | Fresh (Fodder) | To increase milk and butter production |
| *Hypericum perforatum* L. | Hypericaceae | Kantaron | Aerial parts | Infusion | Stomachache (The infusion prepared in aerial parts is given to the animals internally against stomachache.) |
| *Juglans regia* L. | Juglandaceae | Ceviz | Fruits | Fresh | Poisoning cases (Half-ripe fruits are fed to animals.) |
| *Mentha longifolia* (L.) L. | Lamiaceae | Pünk | Leaves, flowers | Infusion | Stomachache (The infusion prepared in leaves and flowers is given to the animals internally against stomachache.) |
| *Thymus praecox* subsp. *grossheimii* (Ronniger) Jalas | Lamiaceae | Yayla kekiği | Aerial parts | Fresh (Fodder) | To increase milk and butter production |
| *Linum bienne* Mill. | Linaceae | Keten | Seeds | Oil | Disinfectant (The oil prepared from seeds is applied to the skin externally against parasites, lice, tick, flea.) |
| *Malva sylvestris* L. | Malvaceae | Ebegümeci | Leaves | Crushed | Wounds (The leaves are crushed and rubbed into wounds.) |

| | | | | | |
|---|---|---|---|---|---|
| *Veratrum album* L. | Melanthiaceae | Sumah | Roots | Decoction | Disinfectant (The decoction prepared from roots is applied to the skin externally against parasites.) |
| *Ficus carica* L. | Moraceae | İncir | Latex | Fresh | Warts (Fresh latex is used externally for warts on cow udder.) |
| *Olea europaea* L. | Oleaceae | Delice | Fruits | Olive oil | Gastrointestinal ailments (Olive oil is added to animal fodder as an antiflatulent.) |
| *Oxalis acetosella* L. | Oxalidaceae | Yonca | Aerial parts | Fresh (Fodder) | To increase milk and butter production in livestock To increase egg production in poultry |
| *Plantago major* L. | Plantaginaceae | Sinirli ot | Leaves | Crushed | Wounds (The leaves are crushed and rubbed into wounds.) |
| *Pennisetum glaucum* (L.) R.Br. | Poaceae | Sıçansaçı | Seeds | Dried/ fresh (Fodder) | Fodder for domestic birds |
| *Zea mays* L. | Poaceae | Mısır | Stems, corncob | Dried (Fodder) | To increase milk production |
| *Rumex alpinus* L. | Polygonaceae | Dağ pazısı | Leaves | Fresh (Fodder) | To increase milk production |
| *Helleborus orientalis* Lam. | Ranunculaceae | Noelgülü | Leaves | Decoction | Respiratory tract ailments, disinfectant (The decoction prepared from leaves is applied to the skin externally.) |
| *Frangula alnus* Mill. | Rhamnaceae | Zigarotu | Leaves | Fresh (Fodder) | To increase milk production |
| *Alchemilla sericata* Rchb. ex Buser | Rosaceae | Kurtayağı | Leaves, flowers | Fresh (Fodder) | To increase milk and butter production |
| *Alchemilla speciosa* Buser | Rosaceae | Dokuztepe, Paraotu, | Leaves, flowers | Fresh (Fodder) | To increase milk and butter production |
| *Prunus avium* (L.) L. | Rosaceae | Kiraz | Barks | Decoction | Diarrhea (The decoction prepared in barks is given to the animals internally.) |
| *Rubus idaeus* L. | Rosaceae | Mora | Leaves | Fresh (Fodder) | To increase butter production |
| *Viscum album* subsp. *austriacum* (Wiesb.) Vollm. | Santalaceae | Tutkal | Leaves | Dried/fresh | Diarrhea (Fresh or dried leaves are fed to animals.) |
| *Aesculus hippocastanum* L. | Sapindaceae | Sancı kestanesi | Fruits, cupula | Fresh | Pain reliever, stomachache (The inner white part of the cupula and the fruits are fed to the animals.) |
| *Ulmus glabra* Huds. | Ulmaceae | Karaağaç | Leaves | Fresh (Fodder) | To increase milk production |
| *Urtica dioica* L. | Urticaceae | Sırgan | Aerial parts | Fresh (Fodder) | To increase milk production, diarrhea (The fresh aerial parts of plants are fed to the animals.) |

## RESULTS AND DISCUSSION

The results of the study showed that shepherds and local animal breeders in Trabzon province use various ethnoveterinary methods for the health and welfare of their animals.

Ethnoveterinary records in the study were obtained from face-to-face interviews with 50 people (16 female and 34 male). The age of the informants ranged from 36 to 78. The results showed that the plants are used both in the treatment of ailments and in increasing the fat and milk yield in animals (Table 1).

Ethnoveterinary treatments are commonly applied in cows and sheep. This is followed by goats, poultry, and domestic birds. In this study, a total of 47 plant taxa from 33 families used by shepherds and animal breeders for animal productivity and health were identified. These plants are commonly used in the treatment of ailments such as external and internal parasites, skin ailments, wounds, disinfectants, diarrhea, urinary tract ailments. The results showed that the most dominant family in terms of the number of species in the region was Asteraceae (6), followed by Rosaceae (4), Apiaceae, Fabaceae (each 3), and the remaining families having two or one species (Figure 2). Mostly aerial parts (17) and leaves (16) were used in traditional treatment. These are followed by fruit (5), flower (3), root (3), and seed (3), respectively (Figure 3). Guler et al. in 2021 and Eraslan and Kultur in 2019 in their study reported that leaves were the most used plant part [13, 16]. The most common drug preparation method used by informants is a decoction, followed by fresh, crushed, and infusion. The decoction was also determined as the most common use in the ethnobotanical study performed in Trabzon [29]. Aerial parts of plants and decoction method are widely used in ethnoveterinary practices in the world [30-33]. Because it is easier to collect the herbal drugs as a whole and to prepare the decoction in practice. A significant part of the plants is preferred as fresh fodder to obtain more milk and butter from livestock. Chief among these are *Taraxacum serotinum, Trifolium pratense, Vicia cracca,* and *Quercus petraea* subsp. *iberica.*

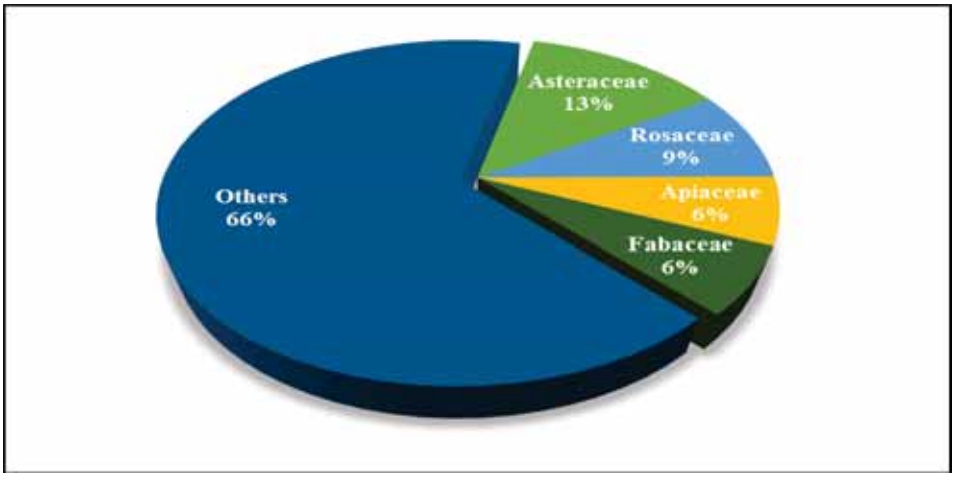


**FIGURE 2**
**The most frequently used plant families**

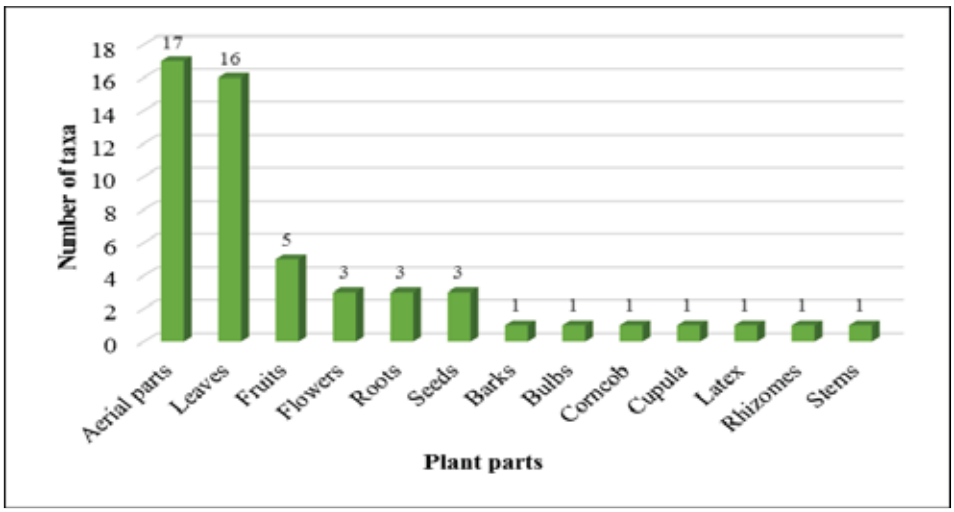


**FIGURE 3**
**Plant parts used**

**TABLE 2**
**Informant consensus factor (ICF) for each ailment category**

| Ailments categories | Ailments | Nt | Nur | ICF |
|---|---|---|---|---|
| Digestive tract ailments | Diarrhea, stomach ailments, gas pains, dyspepsia | 11 | 34 | 0,74 |
| Milk/Butter production | Milk/Butter production | 21 | 47 | 0,57 |
| Poisonings | Poisonings | 2 | 24 | 0,93 |
| Respiratory tract ailments | Respiratory failure | 1 | 6 | 1,00 |
| Skin ailments | External parasites, skin inflammation lice, tick, flea | 12 | 44 | 0,73 |
| Urinary tract ailments | Urethritis, hemoglobinuria, dysuria | 1 | 11 | 1,00 |
| Wounds | Wounds, warts | 7 | 37 | 0,83 |

**TABLE 3**
**Medicinal plants for the most frequently reported ailments based on the fidelity level (FL) index**

| Taxon | Ailments | Ip | Iu | FL (%) |
|---|---|---|---|---|
| *Allium cepa* | Skin inflammation | 28 | 36 | 78 |
| *Ficus carica* | Warts | 24 | 26 | 92 |
| *Malva sylvestris* | Wounds | 18 | 24 | 75 |
| *Sambucus ebulus* | External parasites | 25 | 33 | 76 |
| *Plantago major* | Wounds | 29 | 35 | 83 |
| *Taraxacum serotinum* | Milk production | 10 | 15 | 67 |
| *Vicia cracca* | Milk production | 27 | 31 | 87 |

As a result of survey evaluations, ailments are grouped under seven categories. In the current study, the ICF value ranges from 0.57 to 1, and FL ranges from 67 to 92% (Table 2 and Table 3).

According to local informants, the medicinal plants most frequently are used for milk and butter production, followed by skin ailments, wounds, and digestive tract ailments. Respiratory and urinary tract ailments have the highest ICF value (1.00). Poisonings have the second-highest ICF value (0.93), wounds have the 3rd highest ICF value (0.83). The lowest ICF value with 0.57 corresponds to milk/butter production. ICF values were found between 0.74 and 0.90 in the study performed in Giresun, a province adjacent to the study area. Foot and mouth wounds were the disease group with the highest value [13]. In a study performed in Pakistan, the ICF value of respiratory tract ailments was found to be the highest [33]. Skin ailments and injuries are the most common complaints of informants. The very rough terrain of the region and the density of living cover can be account as the leading cause of the injuries. Milk and butter production is so significant in the region. Butter and some dairy products have received geographical indications [34]. For this reason, they take care to feed their animals with natural fodder plants.

Plants with high FL values in the study were *Ficus carica* (92%) for warts, *Vicia cracca* (87%) for milk production, and *Plantago major* (83%) for wounds. The high fidelity level (FL) confirmed that the plants in question were used more by the informants compared to other plants used for the same purpose. In a study in Turkey, it was reported that *Ficus carica* was used for papillomatosis [15]. It has been reported to be used in similar situations for human health [35]. The wound healing properties of *Plantago major* have also been proven by laboratory studies [36].

There is no record of the use of plant species *Valeriana alliariifolia* and *Pennisetum glaucum* in ethnoveterinary medicine in Turkey [13-16, 37]. *Valeriana alliariifolia* is used against external parasites, while *Pennisetum glaucum* is used as bird food. Their use for this purpose was recorded for the first time.

The informants stated that although they know the toxic effects of *Helleborus orientalis* and *Equisetum arvense*, they prefer to use them in treatment. However, they tried to minimize their harmful effects by preparing the plants as a decoction. In addition, they frequently use *Trifolium pratense* and *Juglans regia* in poisoning caused by these plants, as in all poisoning cases.

## CONCLUSIONS

Ethnobotanical and ethnoveterinary practices are traditional methods used more than medical drugs and veterinary medicine in rural areas and third-world countries. However, the irregular use of

medicinal plants threatens biodiversity. In the study, the areas where *Ficus carica*, *Plantago major*, *Vicia cracca*, *Sambucus ebulus*, and *Malva sylvestris* with high FL values spread are frequently destroyed. A significant part of the plants in the region is used as fodder crops. Various endemic plants such as *Trifolium elongatum*, which is also in Table 1, are also under threat. I hope that the study will draw attention to the need to protect biological diversity and contribute to the development of herbal medicines.

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