

Ethnoveterinary medicine in Turkey: a comprehensive review

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Abstract: Today, traditional societies throughout the world possess a wealth of ethnoveterinary knowledge, which they have accumulated during prolonged interaction with nature. Turkey has ample resources of ethnoveterinary medicines as evident from its rich floral diversity and traditional botanical knowledge from the past. This review aims to compile herbal remedies used in ethnoveterinary medicine in Turkey with comprehensive usage information and to compare our findings with pharmacological studies. The botanical, family, and local names; used parts; preparation methods; administration/dosage and duration of the treatment; and ailments treated/therapeutic effects were presented by screening ethnobotanical and ethnoveterinary studies. The most cited plant families, the medicinal plants, and the most common animal diseases were determined and presented in graphics. A total of 251 taxa belonging to 67 families were reported as being traditionally used to treat animal diseases in Turkey. Fabaceae (25 taxa), Asteraceae (24 taxa), Lamiaceae (19 taxa), Rosaceae (19 taxa), Apiaceae (9 taxa), Poaceae (8 taxa), and Solanaceae (7 taxa) were found as the most cited plant families. The most cited medicinal plants were *Helleborus orientalis* Lam. (9), *Allium sativum* L. (9), *Juniperus oxycedrus* L. subsp. *oxycedrus* var. *oxycedrus* (9), *Berberis crataegina* DC. (8), *Pinus brutia* Ten. var. *brutia* (7), *Sambucus ebulus* L. (6), *Cydonia oblonga* Mill. (6), and *Olea europaea* L. (6), respectively. These plants are frequently used to cure various animal ailments such as dermatological, gastrointestinal, and parasitic diseases. The pharmacological studies of the said plant species were also gathered and reviewed to convey the efficacy of these plants in the treatment of animal diseases. Considering the traditional usage of the reported medicinal plants, more pharmacological studies are required for confirming the effectiveness of these herbal remedies.

Key words: Animal diseases, ethnoveterinary, traditional medicine, medicinal plants, Turkey

1. Introduction

Ever since ancient times, people have used natural resources such as plants, minerals, and animal products to treat many diseases in themselves and their animals. Millions of people in developing countries and rural societies prefer medicinal plants for primary healthcare [1]. Because of the belief that medicinal plants are cheaper and safer than conventional therapy, their popularity has increased even more in recent years. It is said that approximately 90% of the world's population continues to rely on traditional knowledge not only for personal healthcare but also for the treatment of animal conditions. Nowadays between 50,000 and 70,000 plant species are used for medicinal purposes all over the world [2,3]. Ethnoveterinary and ethnobotanical studies are known to be the most suitable ways to find out medicinal plants used in animal diseases.

The study of ethnoscience started in the middle of the last century and researchers began to use subdivisions in their scientific reports, such as ethnobiology, ethnozoology, ethnobotany, and ethnoveterinary. Ethnozoology is defined as the study of existing cultures and their relationships

with the animals in the environments surrounding them. Ethnozoological studies are necessary to detect and record herbal remedies that are essential for animal health. Hippocrates (5th century BC), Dioscorides (1st century AD), Avicenna (10th century AD), and Ibn al Baitar (12th century AD) are the best known medicinal researchers that used faunal resources in ancient times. However, few studies have been conducted on Anatolian ethnozoology in particular [4,5].

As a result of the relationship between humans and plants, which has been going on for centuries, ethnobotany was born and serious studies were conducted on it. Ethnobotanical studies not only document the interactions of mankind with plants, but also determine medicinal plants that have an important place in both human and animal health. The Anatolian lands, which hosted many civilizations, constitute a very rich research environment for studies about traditional veterinary medicine due to cultural richness and the abundance of faunal and floral elements [3,6,7]. The widespread use of medicinal plants in Turkey is related to the richness of the local flora, which

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includes more than 10,000 species of vascular plants with a nearly 31% endemism rate [8]. As is the case elsewhere in the world, the majority of Turkish people living in rural areas use plants for medicinal purposes. Since these practices are orally transmitted from generation to generation, they face the danger of extinction and thus this valuable heritage needs to be documented. The beginning of ethnobotanical studies in Turkey dates back to the early 19th century. In recent years, the extensive knowledge on traditional medicine has drawn the attention of many researchers in our country as well. According to the literature, it can be said that ethnobotanical studies in our country have mostly been conducted in the Central Anatolia Region and that the lowest number of studies have been performed in the Southeast Anatolia Region. Some of these studies include medicinal plants used in animal diseases [3,6,9].

Ethnoveterinary knowledge is the practice of local people in a given area to maintain the health and ensure the wellbeing of their domestic animals, and treat livestock ailments with their traditions, customs, and beliefs. Ethnoveterinary research focuses on systematic investigation and application of folk veterinary knowledge, theory, and practice [10,11]. Although historical records show that the relations of people with animals have existed for over 14,000 years, the recognition of traditional medicine for animals is a very recent one in scientific circles. Early studies in the field of folk veterinary beliefs and practices as the subject of scientific research began to emerge in the mid-1970s and gained momentum from the early 1980s. The term “ethnoveterinary” was introduced after the mid-1980s. Over the past 35 years, professionals from various fields have researched, evaluated, and documented the potential effectiveness of traditional animal health practices throughout the world. Traditional Turkish culture and history based on ancient Anatolian civilizations such as Hittite, Persian, Roman, Byzantine, Selçuk, and Ottoman are the foundations of Turkish folk medicine and ethnoveterinary medicine. Resources reveal that people’s association with animals started around 6000 BC with cattle in Anatolia. Much ethnoveterinary information on domestic animals is available from the past. For instance, *De Materia Medica*, the work of Dioscorides, is assumed to be one of the most important pharmaceutical books of antiquity and the first well-documented study on medicinal plants in Anatolia. *Materia Medica*, considered to be the oldest comprehensive document on Anatolian folk medicine, mentions 8 drugs (7 herbal) for veterinary purposes. Although the usage of medicinal plants in animal diseases is widespread, records are inadequate in many countries [12–14]. An increasing number of ethnoveterinary studies have very recently focused on the documentation of traditional ethnoveterinary knowledge

in Turkey. Many of these studies have been conducted in the last decade [15–21]. Furthermore, ethnobotanical studies containing traditional knowledge of plants used in animal diseases provide information on the ethnoveterinary practices in Turkey [21–79].

Medicinal plants included in ethnobotanical and ethnoveterinary studies have become increasingly recognized as valuable sources for pharmacological studies. However, the most important problems encountered in herbal remedies are the lack of standardization of the active substance in the herbal preparations in terms of concentration and purity and the inability to control their side effects. More recently, the scientific evaluation of ethnobotanical knowledge has become much more common, particularly as a number of drug discovery studies have begun the regular screening of traditional herbal remedies [3,6,9].

Considering Turkey’s floral richness and abundance of traditional medicinal knowledge from the past, ethnoveterinary and ethnobotanical studies based on these features need to be compiled. It is of utmost importance to maintain traditional knowledge that is likely to be lost if it is not given enough importance. Documentation of the traditional practices through ethnobiological studies is also crucial for the conservation and utilization of biological resources. The main purpose of this study is to compile medicinal plants used in ethnoveterinary medicine in Turkey with detailed usage information. Also included is an overview undertaken on the pharmacology, phytochemistry, and toxicity of plants to evaluate ethnobotanical claims and to identify gaps required to be filled by future studies, which could lead to new pharmaceuticals.

2. Methodology

2.1. Literature search

Ethnobotanical and ethnoveterinary studies carried out in different regions of Turkey from 1990 to 2018 were reviewed and medicinal plants used to treat animal diseases were determined. Relevant studies were searched in detail and were collected from books, doctorate dissertations and master’s theses, and scientific literature databases (PubMed, Scopus, Google Scholar, Web of Science, SciFinder, Springer, and Elsevier). Key words such as “ethnoveterinary”, “ethnobotany”, and “medicinal plants + animal diseases” for ethnoveterinary research and “*Helleborus orientalis*”, “*Allium sativum*”, “*Juniperus oxycedrus*”, “*Sambucus ebulus*”, “*Pinus brutia* var. *brutia*”, “*Berberis crataegina*”, “*Cydonia oblonga*”, and “*Olea europaea*” for pharmacological discussion were used to facilitate access to the related information. The scientific names of plants and plant families were verified using the International Plant Names Index (<https://www.ipni.org/>).

2.2. Data analyses

Specific information about medicinal plants such as botanical, family, and local names; used parts; preparation methods; administration/dosage and duration of the treatment; and ailments treated/therapeutic effects are presented in Table 1. Moreover, the most cited plant families, the most cited medicinal plants, and the most common animal diseases are presented in graphics (Figures 1–3).

3. Results and discussion

From the literature search, 7 ethnoveterinary and 59 ethnobotanical articles were obtained. A total of 37 pharmacology papers were referred to in order to evaluate the effectiveness of traditional usage of the most cited plants.

3.1. Evaluation of data

A total of 251 taxa belonging to 67 families were reported as being traditionally used to treat animal diseases in Turkey (Table 1). The bioactive compounds of families are given in Table 2. The first eight plant families with the highest number of plants used for ethnoveterinary purposes were determined as Fabaceae (25 taxa), Asteraceae (24 taxa), Lamiaceae (19 taxa), Rosaceae (19 taxa), Apiaceae (9 taxa), Poaceae (8 taxa), and Solanaceae (7 taxa) and findings are shown in Figure 1. The most popularly cited medicinal plants and their corresponding number of references were *Helleborus orientalis* Lam. (9), *Allium sativum* L. (9), *Juniperus oxycedrus* L. subsp. *oxycedrus* var. *oxycedrus* (9), *Berberis crataegina* DC. (8), *Pinus brutia* Ten. var. *brutia* (7), *Sambucus ebulus* L. (6), *Cydonia oblonga* Mill. (6), and *Olea europaea* L. (6), respectively (Figure 2). It was found that the leaves were the most frequently used part of the plant, accounting for 21%. Fruits were the second most frequently used part of the plant (14%). Following in this category are aerial parts (10%), roots (8%), flowers (6%), seeds (5%), unspecified parts (5%), tar (4%), stem (4%), branches (2%), bulb (2%), and rhizomes (1%). The averages of other parts including tuber, shoot, resin, spine, bud, latex, straw, tassel, molasses, stalk, bran, grain, cone, sauce, gum, gall, and pollen were less than 1%. They are given as one category (18%) in Figure 3. Decoction (12%) was the most frequently used preparation method, followed by infusion (9%), crushing (4%), mashing (3%), powdering (3%), and others (12%). In some studies, the preparation methods were not mentioned and the proportion of these unspecified methods was found to be 57%. Internal application (47%) was used more often than external application (34%); the rate of unspecified application was 19%. In addition, the most common animal diseases were categorized into the following sections: dermatological diseases (wounds, fistula, abscess, interdigital dermatitis, mange, sunstroke and sunburn, ringworm, trichophytosis,

open sores, mouth sores, eczema, warts, dermatitis madigans, epidermolysis bullosa, snake bites, burns, bee stings), gastrointestinal diseases (abdominal distention, swelling, tympany, carminative, constipation, enteric, purgative, diarrhea, intestinal gas), parasitic diseases (leeches, antiparasitic, gastrointestinal parasites, endoparasites, anthelmintic, worms, antifungal, fleas and lice, tick, acaricide, babesiosis, papillomatosis, fasciolosis, malaria, foot-and-mouth disease), respiratory diseases (cough, cold, lung diseases, emphysema, distemper), reproductive diseases (for increasing fertility, for increasing egg production, mastitis, low birthrates, retained placenta, difficulty of birth, animal breeding, for increasing milk secretion), pain (analgesic, pain reliever, stomachache, abdominal pain, liver pain, injuries), and foot-and-mouth disease and eye diseases (keratoconjunctivitis, keratitis, blindness, cataract). Dermatological diseases were the ailments treated by the highest number of plants, followed by gastrointestinal diseases (Figure 4).

3.2. Pharmacological studies

3.2.1. *Helleborus orientalis* Lam. (Ranunculaceae)

People benefit from leaves, roots, and rhizome for medicinal purposes. However, the preparation method of the plant has not been reported in many studies. Roots are the most frequently used part of the plant. Crushed roots of *H. orientalis* are added to fodder as an immunostimulant and inserted into the ears or tails of animal to treat colds [31,66]. Cut roots are inserted into the ear to cure animal weaknesses [78]. Roots are also used externally for the treatment of mastitis, keratitis, and edema [28,45]. Roots are prepared by decoction to treat malaria [28]. While leaves are used externally as an antipyretic and analgesic [22] and for the treatment of joint ailments [31], they are used internally for the treatment of diarrhea and colds [29–31]. Rhizomes are also used for the treatment of diarrhea and colds, but the preparation and administration methods were not mentioned in the literature [30]. According to other records, rhizomes are inserted into a cow's ear to treat colds [29] and they are added to fodder to treat diarrhea [29]. Moreover, they are administered externally against sunstroke [23]. There are few studies supporting the traditional use of the plant. It was reported that ethanol extracts of *H. orientalis* roots showed antiinflammatory activity in mice (carrageenan-induced hind paw edema model) and antinociceptive activity was observed using the p-benzoquinone-induced abdominal constriction test [80]. Moreover, leaf and flower extracts of *H. orientalis* showed potent antioxidant activity [81].

3.2.2. *Allium sativum* L. (Amaryllidaceae)

People use bulbs of *A. sativum* in the treatment of various animal diseases. Crushed bulbs are mixed with yogurt and applied to treat sunstroke and sunburn, ringworm, mange, interdigital dermatitis, constipation, and distemper

Table 1. Plants used in ethnoveterinary medicine in Turkey.

Botanical and family names	Local names	Used parts	Preparation	Administration/ dosage and duration of treatment	Ailments treated/therapeutic effect	Refs.
Acanthaceae						
<i>Acanthus hirsutus</i> Boiss.	Akdiken	-	-	Int	Cold	[24]
<i>Acanthus spinosus</i> L.	Karadiken	Aer	Dec	Int	Diarrhea	[25]
Adoxaceae						
<i>Sambucus ebulus</i> L.	Mürver otu, Mürver ağacı, Sultanotu, Yelligelin, Lor, Şahmelek	Fr, Fl, St	-	Int/Ext	Gastrointestinal diseases, respiratory diseases, dermal diseases and wounds	[15]
		L	Cru	Ext	Inflamed wounds	[26]
		Aer	-	Ext	Inflammatory swellings	[27]
		L	Sm	Ext	Analgesic	[27]
		Aer	Cru	Ext	Mastitis	[28]
		St	Cru	Ext	Ticks	[29]
		L	He	Ext	Chick diseases	[29]
<i>Sambucus nigra</i> L.	Mürver, Mürver çiçeği, Kara mürver	Ba	Dec	Int	Antifungal, antiparasitic	[26]
		L	Cru	Ext (Wrp)	Wounds	[28]
Amaranthaceae						
<i>Beta vulgaris</i> L.	Şeker pancarı	Ro	Pow	Ext	Open skin wounds	[16]
		L	Pu	-	Constipation, increasing milk secretion	[17]
		L	-	Ext	Abscesses and wounds	[18]
		Ro	-	Ext	Keratoconjunctivitis	[18]
Amaryllidaceae						
<i>Allium cepa</i> L.	Soğan	Bl	-	-	Fistulas, wounds, difficulty of birth, retained placenta, appetizer	[17]
		-	-	Int	Cold, abdominal distention	[24]
		Bl	Ma	Ext	Open skin wounds, abscesses, interdigital dermatitis	[16,19]
		St	Ma	-	Abscesses, crushing injury	[18]
<i>Allium sativum</i> L.	Sarımsak	Bl	Cru (+ yogurt)/ Pou (+ salt/ lemon juice, vinegar)	Int/Ext	Sunstroke and sunburn, ringworm, mange, interdigital dermatitis	[16]
		-	-	Int	Chicken diseases	[24]
		Bl	-	Int	Poisoning	[20,26,31]
		Bl	Cru (+ yogurt)	Int (dogs are bottle- fed)/Ext (pasted onto afflicted areas)	Constipation, distemper, mange	[19]
		Bl	-	Ext	Hip lameness, abscesses, sunstroke, poisoning, trichophytosis, babesiosis, mange, and leeches	[18]
		Bl + milk	Prs	Int (drink one big cup 2 × 1 for 2-3 days)	Carminative (relieve flatulence)	[32]
		Bl	Cru	Ext	Mange in ruminants	[21]
		Bl	Pill	Int	Babesiosis in ruminants	[21]
<i>Allium</i> sp.	Sarımsak, Yabani sarımsak	Bl	-	-	Hair loss, swelling, increasing fertility, appetizer in pigeons, opisthotonos, diarrhea in partridges	[17]

Table 1. (Continued).

Anacardiaceae						
<i>Cotinus coggygria</i> Scop.	Sarı can, Tetra, Tetera	L	Dec	Int	Wounds	[28]
		L	Inf	Ext	Eczema	[33]
<i>Pistacia terebinthus</i> L.	Menengiç, Çetemük, Yabani fıstık, Çıtırık, Çedene	St, Fr, Fl	-	Int	Gastrointestinal diseases, respiratory diseases	[15]
		Gu	-	-	Broken foot, wounds	[17]
<i>Rhus coriaria</i> L.	Sumak	L, Br	Pol	Ext	Edema in legs	[34]
		Fr	Inf	Ext	Ringworm, open skin wounds	[16]
		Fr	Inf	-	Foot-and-mouth disease	[18]
<i>Rhus</i> sp.	Sumak	Fr	-	-	Diarrhea, foot-and-mouth disease	[17]
Apiaceae						
<i>Conium maculatum</i> L.	Baldıran, Devetabanı, Hırhındırık, Yılan otu	Aer	Dec	-	Malaria	[28]
<i>Coriandrum sativum</i> L.	Kişniş, Aş otu, Kuzbere, Yumurcak, Karakimyon	Fr	-	Int	Gastrointestinal diseases, respiratory diseases	[15]
<i>Daucus carota</i> L.	Yabani havuç	Fr	-	Int	Parasitic diseases, reproductive diseases	[15]
<i>Ferula elaeochytris</i> Korovin	Çakşır	Ro, Fl, S, Fr	Dec, Pow, Inf, Ju, Spi, Che	Int	Bovine and ovine animals' sterility	[35]
		Ro	-	Int	Parasitic diseases, reproductive diseases	[15]
<i>Ferulago trachycarpa</i> Boiss.	Yayla çağşırı	-	-	Int	Animal breeding	[24]
<i>Foeniculum vulgare</i> Mill.	Rezene, Yabani anason	Fr, L, S, Ro	-	Int	Gastrointestinal diseases, parasitic diseases	[15]
		Aer	-	Int (Fd)	Flatulence	[36]
<i>Heracleum sphondylium</i> subsp. <i>ternatum</i> (Velen.) Brummitt	Devesil, Devesil otu	Ro	Cut	Int (Fd)	Increasing milk production	[37]
		Ro	Cho	Int	Galactagogue (increasing milk secretion)	[26]
<i>Sanicula europaea</i> L.	Kadra, Tatahan çayırı	Aer	-	-	Chick diseases	[38]
<i>Seseli gummiferum</i> subsp. <i>corymbosum</i> (Boiss. & Heldr.) P.H.Davis	Çağşır, Çaşır, Çakşır	L	-	Int	Animal breeding	[24]
Apocynaceae						
<i>Nerium oleander</i> L.	Zakkum, Ağu ağacı, Kan ağacı	L, Br	Dec	Ext	Scabies	[34]
		L	-	Int	Reproductive diseases	[15]
		-	-	Int	Endoparasites, foot-and-mouth disease	[24]
<i>Dracunculus vulgaris</i> Schott	Kara kabak, Yılanburçağı, Yılan burçalağı, Yılançeği	Tb	Cho (+ salt)	Int	Analgesic (relieve chronic pains and aches)	[39]
		Fr	Fre	Ext	Carminative (relieve flatulence)	[32]
		Ro	Dec	Ext	Scorpion and snake bites	[40]
		Ro	-	Int	Abdominal pain	[41]
		Tb	Dec (+ milk)	Ext	Edema	[42]
Araliaceae						
<i>Hedera helix</i> L.	Sarmaşık, Duvar sarmaşığı, Orman sarmaşığı	Aer	-	-	Increasing milk secretion	[17]
		L	Dec	Ext	Constipation	[43]
Asparagaceae						
<i>Ornithogalum umbellatum</i> L.	Akyıldız, Sunbala, Köpek soğanı, Tükrükotu	Ro	-	Ext	Dermal diseases and wounds	[15]
<i>Ruscus aculeatus</i> L.	Tavşan memesi	Ro	-	Int/Ext	Parasitic diseases, respiratory diseases, dermal diseases and wounds	[15]

Table 1. (Continued).

<i>Ruscus hypoglossum</i> L.	Yekesek otu, Dilcik, Tavşan elması,	Aer	-	Int	Cold, mastitis	[26]
Asteraceae						
<i>Anthemis chia</i> L.	Beyaz papatya, Eşek papatyası	Fl	-	Int/Ext	Gastrointestinal diseases, dermal diseases, and wounds	[15]
<i>Anthemis</i> sp.	Papatya	Fl	-	-	Diarrhea	[17]
<i>Arctium minus</i> (Hill) Bernh.	Domuz pıtrağı, Kabalak, Yılan otu, Yılandık	L	Pou (Ju)	Ext	Worms in wounds	[27]
<i>Arctium tomentosum</i> Mill.	Dulavrat otu, Kelotu	Ro, L, Fl	-	Int/Ext	Dermal diseases and wounds	[15]
<i>Arctium platylepis</i> (Boiss. & Bal.) Sosn. ex Grossh.	Dulavrat otu, garahort, deve tabanı, çile dağı	Ro	Pou	Ext	Swollen legs	[44]
<i>Artemisia absinthium</i> L.	Yavşan otu, Pelin otu, Acı pelin, Ak pelin, Mide otu, Acı yavşan	L, Fl	-	Int	Gastrointestinal diseases, parasitic diseases	[15]
		-	-	Int	Cold, abdominal pain, open sores	[24]
<i>Cardopatum corymbosum</i> (L.) Pers.	Kuşkonmaz kökü, Diken, Kurtlu diken	Ro	Dec	Int (Fd)	Mastitis	[45]
<i>Carlina gummifera</i> (L.) Less.	Deve dikenini	Aer	-	-	Wounds	[17]
<i>Centaurea benedicta</i> (L.) L.	Mübarek ot, Mübarekdikeni, Bostan otu, Şevketotu	Fl	-	Int	Gastrointestinal diseases, reproductive diseases	[15]
<i>Centaurea solstitialis</i> L. subsp. <i>solstitialis</i>	Koruğoz, Sarıdiken	Aer	Dec	Int	Cold	[25]
<i>Cichorium intybus</i> L.	Hindiba	Aer	-	Int	Increasing milk yield	[46]
<i>Cirsium simplex</i> subsp. <i>armenum</i> (DC.) Petr.	Su dikenini, kör kenger	Aer	Dec	Ext	Mange	[44]
<i>Cyanus segetum</i> Hill	Gökbaş, Kökbaş	St, Fl	Cho	Int	Fasciolosis in ruminants	[21]
<i>Doronicum orientale</i> Hoffm.	Acımık	Aer	Cru	Ext	Injuries (as a local antimicrobial)	[39]
<i>Gundelia tournefortii</i> L.	Kenger, Kengerotu	Ro, St	-	Int	Reproductive diseases, oral diseases	[15]
<i>Helianthus annuus</i> L.	Ay çiçeği	S, Wh	-	-	Increasing milk secretion	[47]
<i>Lactuca alpina</i> (L.) A.Gray	Sütliga	Aer	Fre	Int (Fd)	Increasing milk secretion	[48]
<i>Lactuca serriola</i> L.	Çekme, Meyrilli, Keklikotu, Dikenleşkelhelvası, Karakavuk, Sakızotu	Lt	-	Int	Increasing milk secretion	[25]
		Aer	Inf	Int	Cold	[41]
<i>Matricaria chamomilla</i> L.	Papatya	Aer	-	Int	Reproductive diseases	[15]
		Fl	Inf	-	Tympany, pain	[18]
<i>Petasites hybridus</i> (L.) G.Gaertn., B.Mey. & Scherb.	Ayıkulağı, Farafla, Kabakulakotu, Kabalak, Şemsiyeotu	L	-	Ext	Inflamed wounds	[29]
		L	-	Int (Fd)	Wounds	[30]
<i>Rhaponticum repens</i> (L.) Hidalgo	Kekre	Fl	Inf	Int	Gastrointestinal parasites of ruminants	[21]
<i>Silybum marianum</i> (L.) Gaertn.	Akkız, Ala kenger, Deve dikenini	St, S	-	Int/Ext	Reproductive diseases	[15]
<i>Taaxacum</i> sp.	Sütlü Ot	Pd	Drying	Int (Fd)	Increasing milk secretion	[48]
<i>Tussilago farfara</i> L.	Bandırma yaprağı, Öksürük otu, Kavalak, Sulandık otu	L	Dec	Ext	Inflammatory diseases	[27]
Berberidaceae						
<i>Berberis crataegina</i> DC.	Karamuk, Karamuk dikenini, Diken üzümü, Şam püremi	Ro	Dec	Int	Anthelmintic	[49]
		Ro	Dec	Int	Dysuria	[34]
		Fr, Ro	Dec	Int	Antiparasitic	[50]
		Fr, L	-	Int	Respiratory diseases, reproductive diseases	[15]
		-	-	Int	Endoparasites, liver pain, mastitis	[24]
		Ro	Inf	-	Cough, gastrointestinal parasites	[18]
		Ro	Inf	Int	Fasciolosis, gastrointestinal parasites of ruminants	[21]
Ro	Inf	Ext	Worms	[51]		

Table 1. (Continued).

<i>Berberis vulgaris</i> L.	Karamuk	Ro	-	Int	Jaundice	[52]
		Ro	-	Int	Jaundice	[53]
Betulaceae						
<i>Alnus glutinosa</i> (L.) Gaertn. subsp. <i>glutinosa</i>	Sakallı kızıl ağaç, Ela, Boya ağacı	Ba	Dec	Ext	Diarrhea	[26]
Boraginaceae						
<i>Anchusa azurea</i> Mill.	Sığırdili, Gürüz, Gürüz, Tort	L	-	-	Wounds, pain reliever, digestive, digestion facilitator, Foot-and-mouth disease	[17]
Brassicaceae						
<i>Brassica oleracea</i> L.	Lahana	Aer	Dec	Int	Diarrhea	[54]
		L	Ma	Ext	Sunstroke and sunburn	[16]
		L	Ma	Int	Gastrointestinal parasites, burns	[18]
		L	Pic	Int	Gastrointestinal parasites of ruminants	[21]
<i>Fibigia clypeata</i> (L.) Medik.	Sanciotu	Aer	Inf	Int	Animal disease	[55]
<i>Lepidium draba</i> L.	Beyaz çiçek, Acıkavuk, Kedi otu	L, Aer	Ma	Ext	Wounds	[44]
<i>Sinapis arvensis</i> L.	Yabani hardal	Aer	-	-	Increasing fertility	[17]
Cannabaceae						
<i>Cannabis sativa</i> L.	Kendir	S	-	-	Increasing fertility	[17]
Capparaceae						
<i>Capparis spinosa</i> L.	Keber, Kapari, Kedi tırnağı, Kuşkonmaz	Fl, Fr	-	Int	Reproductive diseases	[15]
Caprifoliaceae						
<i>Dipsacus laciniatus</i> L.	Eşek kengeri, FeşciTaağı, Karağan, Süzek, Tafran	Aer	-	Int	Mouth sores (donkeys)	[29]
Caryophyllaceae						
<i>Dianthus</i> sp.	Karanfil	Bd	-	-	Diarrhea	[17]
<i>Gypsophila pilosa</i> Huds.	Çövenotu, Yağlıot	Ro	-	Int	Respiratory diseases, reproductive diseases	[15]
Cistaceae						
<i>Cistus creticus</i> L.	Pamukluk	Fl	Inf	-	Mouth sores	[56]
<i>Cistus laurifolius</i> L.	Domuzpamuklusu, Domuzpamukluğu	Flb	Inf	Int	Diarrhea	[41]
Convolvulaceae						
<i>Convolvulus arvensis</i> L.	Çoban döşeği otu	L	Ma	Ext	Open skin wounds	[16]
Cornaceae						
<i>Cornus mas</i> L.	Kiren, Kızılık, Delice kiraz, Yabani kiraz	Fr	Mar	Ext	Foot-and-mouth disease	[57]
		Fr	Mar	Int	Diarrhea	[57]
<i>Cornus sanguinea</i> subsp. <i>australis</i> (C.A.Mey.) Jáv.	Yabani kızılık, Dişi kızılık, Kiren, Şert	Fr	Mar	Ext	Foot-and-mouth disease	[57]
		-	Mar	Int	Diarrhea	[57]
Cucurbitaceae						
<i>Bryonia aspera</i> Steven ex. Ledeb.	At kuyruğu, Hoş devekökü	Wh	Dec	Int	Draining edema, urinary inflammation	[58]
<i>Citrullus lanatus</i> (Thunb.) Matsum. & Nakai	Karpuz	Pe	-	-	Increasing milk secretion	[17]
<i>Cucumis sativus</i> L.	Salatalık	Fr	-	-	Constipation, increasing milk secretion	[17]
<i>Cucurbita</i> sp.	Kabak	S	-	-	Intestinal parasites	[17]

Table 1. (Continued).

<i>Cucurbita moschata</i> Duchesne	Kabak	S	-	Int	Endoparasites	[18]
<i>Ecballium elaterium</i> (L.) A. Rich.	Eşek hıyarı, Acı dülek, Acı kavun	Fr, Ro	-	Int/Ext	Parasitic diseases, dermal diseases, and wounds	[15]
Cupressaceae						
<i>Cupressus sempervirens</i> L.	Ardıç, Andız	Ta	-	Int	Intestinal gas	[59]
		-	-	Ext (Wrp)	Mastitis, endoparasites	[24]
<i>Juniperus drupacea</i> Labill.	Andız, Diken, Ayı giliği, Enek	Fr, St	-	Int	Parasitic diseases, dermal diseases and wounds	[15]
		-	-	Int	Cough	[24]
		Br, L	Inf	Ext	Pain reliever	[43]
<i>Juniperus excelsa</i> M.Bieb.	Kara ardıç	L	Bur	Ext	Lung diseases	[58]
<i>Juniperus oxycedrus</i> L. subsp. <i>oxycedrus</i> var. <i>oxycedrus</i>	Ardıç, Katran ardıcı	Ta	Inp	Int	Ticks	[39]
		Ta	-	-	Wound-healing	[60]
		Ta	-	Int	Cold	[49]
		Fr	Dec	Int	Cough	[52]
		Wd (Ta), Br	Dis (+ butter), Sm	Ext	Open skin wounds, mange, papillomatosis	[16]
		C	Cru	Int	Appetizer	[25]
		St, Br (Ta)	-	Ext	Lice and mange	[18]
		Br	Inf	Int	Gastrointestinal parasites of ruminants	[21]
		Br	Inf	Ext	Fleas and lice in ruminants	[21]
		Wd (Ta)	-	Ext	Ticks, mange in ruminants	[21]
		Wd (Ta)	Inf	Int	Fasciolosis	[21]
		Wd (Ta)	-	Int	Babesiosis, gastrointestinal parasites of ruminants	[21]
		Ta	-	Ext	Insect repellent	[27]
Dennstaedtiaceae						
<i>Pteridium aquilinum</i> (L.) Kuhn	Ayıotu, Eğer otu, Eğrelti otu, Kızgın otu, Kuzgunotu	Wh	Sm	Ext	Urinary diseases	[41]
		Rh	Dec	Int	Analgesic	[41]
Equisetaceae						
<i>Equisetum hyemale</i> L.	Çam otu, Atkuyruğu, Kurt boğan	Aer	Dec	Int (3 - 4 times a day)	Bloody urination	[27]
Ericaceae						
<i>Erica arborea</i> L.	Funda, Piren, Süpürge otu, Süpürge çalı	Fr	Dec	Ext	Mouth sores, foot wounds	[28]
Euphorbiaceae						
<i>Euphorbia glareosa</i> Pall. ex M.Bieb.	Sütlü ot	Wh	-	Int	Increasing milk secretion	[33]
<i>Euphorbia kotschyana</i> Fenzl	Sütlük, Sütleğen	-	-	Int	Open sores, foot-and-mouth disease	[24]
<i>Euphorbia macroclada</i> Boiss.	Sütleğen otu	Lt	-	Ext	Open skin wounds, papillomatosis	[16]
<i>Euphorbia myrsinites</i> L.	Sütleğen, Balık otu	Aer	Fre	Int (a big cup 2 × 1 for 2-3 days)	Endoparasites	[32]
<i>Ricinus communis</i> L.	Bostan kenesi, Domuz kenesi, Hinttaş, Japon şemsiyesi	S	-	Int (Fd)	Purgative	[33]
Fabaceae						
<i>Anagyris foetida</i> L.	Keçi gevişi, Emicek otu, İyicik, Keçi ibişi, Kokar çalı	L, Br	-	Int	Swelling	[40]

Table 1. (Continued).

<i>Astracantha tmolea</i> (Boiss.) Podl.	Geven, sakızlı geven	Res	Che	Int	Abdominal pain	[35]
<i>Astragalus</i> sp.	Keven, Geven	Spi	-	Ext (Punc)	Papillomatosis	[16]
		Aer	-	-	Increasing milk secretion	[17]
<i>Ceratonia siliqua</i> L.	Keçiboynuzu, Ballıbaba, Ballıboynuz, Harnup	Lt	-	Ext	Papillomatosis	[16]
		Fr, S	-	Int	Gastrointestinal diseases	[15]
		-	-	Int	Mouth sores	[24]
<i>Cicer</i> sp.	Nohut	Fr	-	-	Sound thickening in partridges	[17]
<i>Colutea cilicica</i> Boiss. & Balansa	Sinameki	L	Inf	-	Constipation	[18]
<i>Glycyrrhiza glabra</i> L.	Meyan	Ro	-	Int	Gastrointestinal diseases, respiratory diseases	[15]
<i>Lathyrus sativus</i> L.	Burçak	-	-	Int	Animal breeding	[24]
<i>Lathyrus</i> sp.	Culbant, Cülban	Aer	-	-	Vitamin deficiency, difficulty of birth, increasing milk secretion	[17]
<i>Lens culinaris</i> Medik.	Mercimek	-	-	Int	Cold	[24]
<i>Lens</i> sp.	Mercimek	Str	-	-	Swelling, diarrhea, appetizer	[17]
<i>Lotus aegaeus</i> (Griseb.) Boiss.	Nohodak	Aer	Cru	Ext	Injuries (as a local antimicrobial)	[39]
<i>Lupinus albus</i> L.	Termiğe	S	Inf	Ext	Fleas and lice in ruminants	[21]
<i>Medicago sativa</i> L.	Kaba yonca, Çevrinçe	Aer	-	Int/Ext	Gastrointestinal diseases, dermal diseases and wounds	[15]
<i>Medicago</i> sp.	Yonca	Wh	-	-	Swelling, difficulty of birth, retained placenta, increasing milk secretion	[17]
<i>Melilotus</i> sp.	Boy otu	Aer	-	-	Epidermolysis bullosa	[17]
<i>Ononis spinosa</i> L.	Kayışkırın otu, Ölemez, Yaltak diken, Yandak diken	Wh	-	Int	Urinary retention	[61]
<i>Phaseolus vulgaris</i> L.	Fasulye	Fr, Aer	-	-	Wounds, fracture, increasing milk secretion	[17]
<i>Trifolium</i> sp.	Yonca	L	-	-	Swelling, difficulty of birth, retained placenta, increasing milk secretion	[17]
<i>Trifolium trichocephalum</i> M.Bieb.	Üç kulak otu, yonca, dirfil, tirfil	Aer	-	Int	Increasing milk secretion	[44]
<i>Trigonella</i> sp.	Oğlanlar boyu	Aer	-	-	Epidermolysis bullosa	[17]
<i>Vicia faba</i> L.	Bakla	S, Fl	-	Int/Ext	Gastrointestinal diseases, dermal diseases and wounds, parasitic diseases	[15]
<i>Vicia sativa</i> subsp. <i>nigra</i> var. <i>segetalis</i> (Thuill.) Ser. ex DC.	Eşek gürlü	L	-	Int (Fd)	Increasing milk secretion	[48]
<i>Vicia</i> sp.	Fiğ, Küşne, Burçak, Yabani bakla, Fit	Aer	-	-	Swelling, vitamin deficiency, difficulty of birth, retained placenta, appetizer, increasing milk secretion	[17]
<i>Vigna radiata</i> (L.) R.Wilczek	Maş fasulyesi	Fr	-	-	Increasing milk secretion, muscle builder in partridges	[17]
Fagaceae						
<i>Quercus</i> sp.	Meşe	L, As	-	-	Wounds, diarrhea	[17]
<i>Quercus coccifera</i> L.	Kara çalı, Pynar, Pelit	St (Ba)	Dec	Int	Diarrhea	[25]
<i>Quercus infectoria</i> G. Olivier	Mazı, Pelit, Meşe mazısı, Gerpelit, Meşe	Gl	-	Int	Diarrhea, hemostatic	[62]
<i>Quercus pubescens</i> Willd.	Meşe, Tüylü meşe	Ba	Pow	Ext	Open skin wounds, mange	[16]
		Wd (ash)	Bur	Ext	Open skin wounds, mange	[16]
		St	Inf	Ext	Open skin wounds, abscesses, diarrhea	[18]

Table 1. (Continued).

Geraniaceae						
<i>Pelargonium endlicherianum</i> Fenzl	Solucan otu, Itır	Aer	-	Int	Intestinal parasites	[20]
Hypericaceae						
<i>Hypericum perforatum</i> L.	Kantaron, Sarı kantaron, Binbirdelikotu	Fl, L	-	Int	Gastrointestinal diseases, respiratory diseases, dermal diseases and wounds	[15]
		Flb	Inf	Ext (1 × 1)	Mastitis	[32]
		Flb	Ole	Ext	Wound	[41]
		Fl	Mc	Ext	Wounds	[63]
<i>Hypericum androsaemum</i> L.	Libarga, Püren	Fr	-	Int	Against parasites	[64]
<i>Hypericum capitatum</i> Choisy	Aringe sor	Aer	-	-	Pain relief	[65]
<i>Hypericum capitatum</i> var. <i>luteum</i> N.Robson	Aringe zer	Aer	-	-	Pain relief	[65]
<i>Hypericum retusum</i> Aucher ex Jaub. & Spach	Behtof	Aer	-	-	Pain relief	[65]
<i>Hypericum triquetrifolium</i> Turra	Behtof	Aer	-	-	Pain relief	[65]
Juglandaceae						
<i>Juglans regia</i> L.	Ceviz, Hingç, Koz, Yandak	L	Dec	Int (4 cups 2×1 for 3 days)	Analgesic	[26]
		Imfr	Cru	Ext	Wounds	[66]
		L	-	Ext	Wounds (as an antiseptic)	[67]
		Per (inner part)	-	-	Diarrhea, cough, beautifies the sound of partridge	[17]
Lamiaceae						
<i>Lavandula stoechas</i> L.	Karabaş otu	Aer	-	Int/Ext	Respiratory diseases, dermal diseases and wounds	[15]
<i>Melissa officinalis</i> L.	Oğul otu, Turunca	Fl, L	-	Int	Gastrointestinal diseases, reproductive diseases, oral diseases	[15]
<i>Mentha</i> sp.	Filiskin, Yarpuz, Nane	Aer	-	Int/Ext	Parasitic diseases, reproductive diseases, respiratory diseases	[15]
		L	-	-	Diarrhea	[17]
<i>Ocimum basilicum</i> L.	Fesleğen, İrihan, Peslan, Reyhan	L, S	-	Int	Parasitic diseases, respiratory diseases	[15]
<i>Origanum majorana</i> L.	Guy otu, Mercanköşk, Akkekik	Fl	-	Int/Ext	Dermal diseases and wounds	[15]
<i>Origanum onites</i> L.	Kekik, Deli kekik, Eşek kekiği, Talu kekik, Karabaş kekik	Leb, Aer	Inf	Ext	Mouth sores, foot-and-mouth disease	[20,40]
<i>Origanum sipyleum</i> L.	Güvey otu, Bayır çayı, Kekik	Aer	-	Ext	Wounds	[68]
<i>Origanum syriacum</i> subsp. <i>bevanii</i> (Holmes) Greuter & Burdet	Eşek kekiği, eşek kekiği, güve kekiği, boz kekik, sibilin kekiği, sahilin kekiği	Aer, Flb	Inf, Ju, Oil, Pow, Spi	Int/Ext	Indigestion pains	[35]
<i>Phlomis pungens</i> Willd. var. <i>hirta</i> Velen.	Ayı kulağı, Calba	Aer	-	Int	Diarrhea	[39]
<i>Rosmarinus officinalis</i> L.	Biberiye, Beyaz püren, Kuş dili	Fl, L	-	Int	Gastrointestinal diseases, reproductive diseases, dermal diseases and wounds	[15]
<i>Salvia officinalis</i> L.	Ada çayı, Dişotu, Misk adaçayı, Ayı kulağı	L	Dec	Ext	Cataract	[20]
<i>Salvia pratensis</i> L.	Boz ot	L, Fl	-	Int (Fd)	Appetizer	[43]

Table 1. (Continued).

<i>Salvia tomentosa</i> Mill.	Şalba, Boz şalba, Borçağla Yakı otu	Aer	Inf	Int	Urinary system diseases	[25]
<i>Salvia virgata</i> Jacq.	Fatmana otu, Yılcancık	L	-	Int/Ext	Gastrointestinal diseases, dermal diseases and wounds, oral diseases	[15]
<i>Satureja cuneifolia</i> Ten.	Yayla kekiği, Kara kekik	-	-	Int	Cough, cold, viral diseases	[24]
<i>Teucrium polium</i> L.	Acı yavşan, Ak sedef otu, Sıraca otu, Yavşan otu, Bodurmahmut	L, Flb	Dec	Ext	Wounds	[69]
		Fl	-	Int	Gastrointestinal diseases	[15]
		Aer	Inf	Int	Analgesic	[41]
<i>Thymbra spicata</i> L.	Zahter, Kara kekik	St, L	-	Int/Ext	Gastrointestinal diseases, dermal diseases and wounds	[15]
<i>Thymus cherlerioides</i> Vis. var. <i>cherlerioides</i>	Geven dikenli, Dikenli kekik	-	-	Int	Cold	[24]
<i>Thymus cilicicus</i> Boiss. & Balansa	Kekik, Yer kekiği, Kılçık kekiği	Aer	-	Ext	Parasitic diseases, dermal diseases and wounds	[15]
<i>Vitex agnus-castus</i> L.	Hayıt, Acı ayıt, Beşparmak otu	S, L, Fl, Aer	-	-	Diuretic, diarrhea, abdominal pain, stomach diseases	[70]
		St, Fr	-	Int	Reproductive diseases	[15]
		S	Dec	Int	Pain reliever (horses)	[40]
		Fr	Cru	Int	Constipation	[42]
Lauraceae						
<i>Laurus nobilis</i> L.	Akdeniz defnesi, Hardal, Defne, Çıbıklık, Tanel, Tenhal	Fr, L	Dec	Ext	Parasitic diseases in animals	[71]
		Fr, L	-	Int/Ext	Dermal diseases and wounds	[15]
		L	Dec	Int	Poisoning	[31]
		Fr, L	-	Ext	Pain reliever, insect repellent	[67]
Linaceae						
<i>Linum nodiflorum</i> L.	Yaban keten	S	-	Int/Ext	Gastrointestinal diseases, dermal diseases and wounds	[15]
<i>Linum usitatissimum</i> L.	Keten	S (oil)	-	Ext	Sunstroke and sunburn, ringworm, mange	[16]
		S (oil)	-	Ext	Abscesses	[19]
		S (oil)	-	Ext	Hypodermosis, ticks, fleas and lice, burns	[18]
		S (oil)	-	Ext	Fleas and lice, ticks, mange in ruminants	[21]
Lythraceae						
<i>Lawsonia inermis</i> L.	Kına	L	Pow	Ext	Ringworm	[16]
		L	Pow	Ext (dog)	Fleas and lice	[19]
		L	-	Ext	Trichophytosis	[18]
<i>Punica granatum</i> L.	Nar ağacı, Nar	St, Fr, Fl	-	Int/Ext	Parasitic diseases	[15]
Malvaceae						
<i>Malva neglecta</i> Wallr.	Küçük ebegümece, Çoban çöreği	Aer	-	Int/Ext	Reproductive diseases, dermal diseases and wounds	[15]
		L	-	-	Wounds, diarrhea	[17]
		Aer	(+ whole meal flour)	Int	Chick diseases	[44]
<i>Malva sylvestris</i> L.	Ebegümece, Develik, Ebecik, Ebelik	Fl, L	-	Int	Gastrointestinal diseases, respiratory diseases	[15]
		Aer	Plas	Ext	Lumbago	[20]
		L	Ma	-	Abscess, bee stings	[18]

Table 1. (Continued).

<i>Tilia tomentosa</i> Moench	Gümüşi ihlamur, Ihlamur	L, Fl	-	Int	Gastrointestinal diseases, respiratory diseases, reproductive diseases	[15]
<i>Tilia platyphyllos</i> Scop.	Ihlamur, yaz ihlamuru	St (Ba)	-	Ext	Bone fractures	[43]
Moraceae						
<i>Ficus carica</i> L.	İncir, Yemiş	Lt	-	Ext	Papillomatosis	[16]
		Lt, L	-	-	Papillomatosis	[17]
		-	-	Eaten	Cold	[24]
		Lt	-	-	Warts on cow's udder	[38]
<i>Morus nigra</i> L.	Karadut, Gara dut	Fr	-	Int	Respiratory diseases, oral diseases, parasitic diseases	[15]
		-	-	Int	Mouth sores	[24]
<i>Morus</i> sp.	Dut	Mo, Fr, Wh, L	-	-	Swelling, poisoning, diarrhea, retained placenta, cough, pain reliever, mastitis, difficulty of birth, increasing milk secretion, constipation, appetizer, fistulas, wounds, breast diseases, good development, anemia of partridge	[17]
Myrtaceae						
<i>Myrtus communis</i> L.	Hambeles, Mersin, Murt	Fr, L	-	Int	Respiratory diseases, reproductive diseases	[15]
		-	-	Int	Animal weakness	[24]
Nitrariaceae						
<i>Peganum harmala</i> L.	Üzerlik otu, Süzerlik, Yüvezlik	Aer	Dec	Int	Diarrhea	[20]
Oleaceae						
<i>Fraxinus ornus</i> L. subsp. <i>cilicica</i> (Lingelsh.) Yalt.	Boyalık otu, İşbudak, Karadal,	St (Ba)	Kept in water	Ext	Eye diseases	[41]
<i>Fraxinus angustifolia</i> subsp. <i>oxycarpa</i> (Willd.) Franco & Rocha Afonso	Dişbudak, Diş budağ	Br	Pel (kept in water for a while)	Int	Chicken diseases	[63]
<i>Jasminum fruticans</i> L.	Öküz gözü, Boruk, Borumuk, Kapina, Yabani yasemin	Br	Cut, He (the residual water)	Int	Parasitic diseases	[72]
<i>Olea europaea</i> L.	Sitin, Zeytin	Fr (oil)	-	Ext	Sunstroke and sunburn, mange	[16]
		L	-	Int	Gastrointestinal diseases, reproductive diseases	[15]
		Fr (oil)	-	-	Swelling, constipation, mastitis and breast lumps	[17]
		-	-	Int	Poisoning, abdominal distention, cold	[24]
		Fr (oil)	-	Int (offered as drink)	Constipation	[19]
		Fr (oil)	-	Int/Ext	Abscess, burn, tympany, constipation	[18]
<i>Phillyrea latifolia</i> L.	Kuzu pırnar, Pırnar, Pıynar, Kesme	-	-	Int	Animal blindness	[24]
		L (juice)	-	Ext	Eye diseases (keratitis)	[45,73]
		L	Cru, Che	Ext	Eye diseases	[42]
Orchidaceae						
<i>Orchis italica</i> Poir.	Tavşan topuğu, Topbaş, Dağ salebi	Ro	-	Int	Gastrointestinal diseases	[15]
Papaveraceae						
<i>Chelidonium majus</i> L.	Sarılık otu, Sultan otu, Yara otu, Kırlangıç otu	Aer	Dec	Int (tea cups 4 × 1 for 8 days)	Liver diseases	[26]
<i>Fumaria capreolata</i> L.	Şahdere	Fl	-	Int	Gastrointestinal diseases	[15]

Table 1. (Continued).

<i>Papaver somniferum</i> L.	Afyon, Haşhaş	Fr, S	-	Int	Gastrointestinal diseases, respiratory diseases	[15]
		Fr	Dec	Int	Analgesic	[25]
		Imfr	-	Int	Diarrhea	[25]
<i>Papaver rhoeas</i> L.	Gelincik, Gelin eli, Gelin elması, Alvala	Fr, S	-	Int/Ext	Dermal diseases and wounds, gastrointestinal diseases	[15]
Pedaliaceae						
<i>Sesamum indicum</i> L.	Küncü, Susam	S	-	Ext	Ringworm	[16]
		S	-	-	Muscle builder in partridge	[17]
Pinaceae						
<i>Cedrus libani</i> A.Rich.	Katran, Ardiç	Ta	(+ butter and milk)	Ext	Scabies	[34]
		Ta	-	Ext	Pain of fractures, foot-and-mouth disease rheumatism	[34]
		Ta	-	Ext (Wrp)	Cold, mange, fungal infections, mastitis, poisoning	[24]
<i>Pinus brutia</i> Ten. var. <i>brutia</i>	Andız çamı, Kızıl çam, Pür çam, Şam	Res	(+ hot water)	Ext	Wounds, cuts	[32,74]
		Res	-	Ext	Wounds	[61]
		-	-	Ext (Wrp)	Cold, enteric disorders, low birthrate, endoparasites	[24]
		Ta	-	Ext	Fistulas	[20]
		Ta (pine)	Oi	Ext	Ticks	[32]
		L	Dec	Ext	After pains	[42]
		Ta	-	Ext	Wounds	[36]
<i>Pinus nigra</i> J.F.Arnold		Gu (pine)	-	Ext	Dermatitis madigans, open skin wounds, interdigital dermatitis	[16]
		Res	Pow	Ext	Cracked nipples, sunstroke and sunburn, open skin wounds, interdigital dermatitis, ringworm	[16]
		Wd (Ta)	Dis	Ext	Open skin wounds	[16]
		Gu	-	-	Fracture	[17]
		Ta	-	Ext	Open skin wounds, mange, fracture	[19]
		Gu, Res, Ta	-	Ext	Foot-and-mouth disease, abscess, trichophytosis, burn, wounds	[18]
<i>Pinus nigra</i> subsp. <i>pallasiana</i> (Lamb.) Holmboe	Çam, İşam, Gara şam	L	Cru	Ext	Dog or wolf bites	[75]
		St (Ta)	Inp	Int	Ticks	[39]
		Ta	(+ flour to form pills)	Int	Treat worms	[34]
		Ta	-	Ext (Wrp)	Cold, enteric disorders, low birthrate, endoparasites	[24]
<i>Pinus pinea</i> L.	Fıstık çamı, Küner, Küner çamı	St (Ba)	Ma (+ unsalted butter)	Ext	Wounds	[76]
<i>Pinus sylvestris</i> var. <i>hamata</i> Steven	Çam, Sarı çam	Ta	-	Ext	Insect repellent, wounds	[57]
Plantaginaceae						
<i>Linaria vulgaris</i> Mill.	Kara nevrüz, nevrüz otu	Aer	-	Int	Intestinal parasites	[20]
<i>Plantago</i> sp.	Sinirli ot, Bağa, Pel heves otu, Peli heves, Damalca	Aer	-	-	Abscess/fistula, wounds	[17]

Table 1. (Continued).

<i>Plantago lanceolata</i> L.	Damarlıca, Yilandili, Sinirliot, Çıbanotu	L	Pou (Ju)	Ext	Against parasites	[77]
		L	Ma	Ext	Open skin wounds	[16]
		L	-	Int/Ext	Dermal diseases and wounds, parasitic diseases, respiratory diseases	[15]
		L	Ma	-	Abscesses	[18]
Platanaceae						
<i>Platanus orientalis</i> L.	Ak kavak, Çınar, Kavak	L, Fl, Fr, S, Bd, Po	Inf, Dec, Pow	Int	Runny nose, pains	[35]
		Fr, S	Pow	Int	In case of convulsions	[35]
		Fr	Dec	Int	Diarrhea	[25]
		Fr	(+ wheat and straw)	Int	Cough	[41]
Poaceae						
<i>Avena sativa</i> L.	Yulaf	Aer, Fr	-	Ext	Carminative (relieve flatulence)	[26]
<i>Cynodon dactylon</i> (L.) Pers.	Ayrık otu	Aer	-	-	Increasing milk secretion	[17]
<i>Hordeum</i> sp.	Çavdar otu, Deli çavdar otu, Arpa	Aer, Bn	-	-	Mastitis, breast lump, difficulty of birth, increasing milk secretion	[17]
		Fr	-	Ext	Pain reliever	[40]
<i>Hordeum vulgare</i> L.	Arpa	Gr	Dec	Int (Fd)	Distemper	[19]
		Gr	-	Int	Strangles, emphysema	[18]
<i>Oryza</i> sp.	Pirinç	Gr	Dec	Int (dogs are fed)	Diarrhea	[19]
<i>Triticum</i> sp.	Buğday	Aer, Bn	-	-	Mastitis, breast lumps, difficulty of birth, retained placenta, increasing egg production	[17]
<i>Triticum aestivum</i> L.	Buğday	Gr	-	Int	Strangles, emphysema	[18]
<i>Zea mays</i> L.	Mısır, Lazut	Fr, Fl, Tas	-	-	Increasing milk secretion	[17]
		-	-	Int	Intestinal diseases, brucellosis, piroplasmosis	[24]
		Tas	Inf	Int	Diarrhea, urinary retention	[18,26]
Polygonaceae						
<i>Rheum ribes</i> L.	İşgın, Rives, Aşkın, Işkın, Revam, Uçgun	Ro	Pol	Int	Diarrhea	[77]
		St, Ro	-	-	Wounds, foot-and-mouth disease, intestinal parasites	[17]
		Aer, Ro	Dec	Int	Diarrhea	[20]
<i>Rumex pulcher</i> L.	Çarşaf, Efelek, Efelik, Labada, Lapaza, Mancar, Mancarotu, Pancarotu, Yapalak	Fr	-	Int (Fd)	Cough, illness	[29]
		Fr	-	-	Cough	[30]
<i>Rumex acetosella</i> L.	Kuzukulağı, Tırşok, Tırşık, Ebenekşisi	L, Fr	-	Int	Gastrointestinal diseases, parasitic diseases	[15]
		Aer	-	-	Abscess/fistula, wounds, diarrhea, cough, breast diseases	[17]
Portulacaceae						
<i>Portulaca oleracea</i> L.	Semizotu, Pirpirim	L	-	Int	Gastrointestinal diseases	[15]
		Aer	-	-	Diarrhea, epidermolysis bullosa, hairworm, retained placenta, increasing milk secretion	[17]
Ranunculaceae						
<i>Delphinium staphisagria</i> L.	Bit otu	St	Inc	Ext	Fleas and lice in ruminants	[21]

Table 1. (Continued).

<i>Helleborus orientalis</i> Lam.	Bohça, Bohçaotu, Çöpleme, Çöpötu, Zambak kökü, Babatire	L	-	Ext (behind the ear)	Antipyretic, analgesic	[22]
		Rh	-	Ext	Sunstroke	[23]
		L	-	Ext (Wrp)	Joint ailments	[31]
		Ro	-	Ext (Inserted in ear/tail for 24 h)	Cold	[31]
		L	-	Int	Diarrhea	[31]
		Ro	-	Inserted to ear skin (for 24 h)	Mastitis, keratitis	[45]
		Ro	Dec	-	Malaria	[28]
		Ro	-	Ext	Edema, aphrodisiac	[28]
		L, Rh	-	Int (Fd)	Diarrhea	[29]
		Rh	-	Ext (Insert in cow's ear)	Cold	[29]
		Ro	Cut	Ext (Drilled into the ear kept for 12 hours)	Animal weaknesses	[78]
		Ro	Cru	Ext (Insert in ear for 2 hours)	Cold	[66]
		Ro	Cru	Int (Fd)	Immunostimulant	[66]
		L, Rh	-	-	Diarrhea, cold	[30]
<i>Helleborus</i> sp.	Bohça, Bohçaotu, Çöpleme, Çöpötu, Zambak kökü, Babatire	Stk	-	Ext (Punc)	Edema	[18]
<i>Nigella sativa</i> L.	Çörek otu, Kara çörek	S	-	Int	Reproductive diseases	[15]
		Oil	-	Int	Bruises-sprains, abdominal pain	[24]
Rhamnaceae						
<i>Frangula alnus</i> Mill.	Zigar Otu, Ciğar	L	-	Int (Fd)	Increasing milk secretion	[48]
<i>Paliurus spina-christi</i> Mill.	Çakır diken, Çaltı, Karaçalı, Kışla diken	Fr	Dec (+ root of <i>Asphodelus aestivus</i>)	Int	Mastitis	[45]
Rosaceae						
<i>Agrimonia eupatoria</i> L.	Fitikotu, Kızıl otu, Kızıl yaprak	Aer	-	Int/Ext	Gastrointestinal diseases, dermal diseases, wounds	[15]
<i>Alchemilla</i> sp.	Kurtayağı, Dokuztepe, Paraotu, Fındıkotu, Sarıçiçek	Fl, L	Fre	Int (Fd)	Increasing milk secretion	[48]
<i>Crataegus monogyna</i> Jacq.	Alıç, Kızılıçık, Arıç çakana, Kız elması, Yemişen, Yemişken çalı	Fr, Fl, L	-	Int/Ext	Gastrointestinal diseases, reproductive diseases	[15]
		Spi	-	Ext	Snake bite	[33]
<i>Crataegus</i> sp.	Alıç	Fr	-	-	Constipation	[17]
<i>Cydonia oblonga</i> Mill.	Ayva	S	Cru	Ext	Cracked nipples	[16]
		Fr, S	-	Int/Ext	Gastrointestinal diseases, respiratory diseases	[15]
		L	-	-	Diarrhea	[17]
		L	Inf	Int	Distemper	[19]
		Fr (Pe)	Inf	-	Diarrhea	[18]
		L	Inf	Int	Diarrhea	[41]
<i>Malus</i> sp.	Elma	Fr (vinegar)	-	-	Difficulty of birth, retained placenta, increasing milk secretion, endoparasites of pigeon	[17]

Table 1. (Continued).

<i>Malus pumila</i> Mill.	Elma	Fr (vinegar)	-	Ext	Mange, dermatitis madidans, open skin wounds, papillomatosis	[16]
		Fr (vinegar)	-	Int/Ext	Wart, breast edema, snake bite-bee sting, and leeches	[18]
<i>Mespilus germanica</i> L.	Muşmula, Beşbıyık, Döngel	L	Dec	Int	Diarrhea	[54]
		St Ba	Dec	Int	Anthelmintic	[31]
<i>Potentilla recta</i> L.	Su parmakotu, Beşparmakotu	Ro	-	Int	Oral diseases	[15]
<i>Prunus avium</i> (L.) L.	Kiraz	Stk	-	-	Diarrhea	[17]
		Fr Stk, Br	Dec	-	Diarrhea	[48]
		Fr Stk	Inf	Int	Intestinal diseases	[41]
<i>Prunus divaricata</i> Ledeb.	Dağ eriği	Fr	Dec	Ext	Wound-healing	[79]
		Fr	Inf	Int	Gastrointestinal parasites of ruminants	[21]
<i>Prunus</i> sp.	Erik	Fr	-	-	Constipation	[17]
<i>Prunus armeniaca</i> L.	Kayıtsı, Eşbabiye	Fr	-	-	Abscess/fistula, constipation, mastitis, swelling	[17]
<i>Prunus persica</i> (L.) Batsch	Şeftali	L	(+ olive)	Ext	Wounds, skin diseases	[22]
		L	Inf	Ext	Open skin wounds	[16]
		L	-	-	Wounds	[17]
<i>Prunus spinosa</i> L.	Avşar çalısı, Çakal eriği, Dağ eriği	Aer	Ma	Ext	Wounds	[61]
<i>Pyracantha coccinea</i> M.Roem.	Yemişen, Ateş dikenini, Ebem bükü, Karaçalı, Kırkat, Tavşan elması	L	Dec	Int (drink a cup a day)	Diarrhea	[45]
<i>Pyrus elaeagnifolia</i> Pall. subsp. <i>elaegnifolia</i>	Ahlat	L	Dec	Int	Against swelling	[72]
<i>Rosa canina</i> L.	Gül burnu, Gül elması, Kuşburnu	Fr, Ro	Dec	Int	Diarrhea	[50]
		Fr	-	Int	Gastrointestinal diseases	[15]
<i>Rubus ulmifolius</i> Schott	Böğürtlen	L	-	-	Wounds	[17]
Rubiaceae						
<i>Coffea arabica</i> L.	Kahve	Fr	-	Int	Diarrhea	[18]
<i>Galium verum</i> L.	Boyalık, Yoğurtotu, İplikik	Aer	-	Int/Ext	Respiratory diseases, reproductive diseases, dermal diseases and wounds	[15]
<i>Rubia tinctorum</i> L.	Kök boya, Kızıl boya, Kızıl kök	Ro	-	Int	Gastrointestinal diseases	[15]
Rutaceae						
<i>Citrus limon</i> (L.) Osbeck	Limon	Fr	-	Ext	Open skin wounds, mange	[16]
		Fr	-	-	Cough, appetizer	[17]
		-	-	Int	Poisoning, hypocalcemia, blindness	[24]
		Fr	-	Ext	Keratoconjunctivitis, mange, endoparasites	[18]
Salicaceae						
<i>Populus</i> sp.	Kavak	L	-	-	Increasing milk secretion	[17]
<i>Salix</i> sp.	Söğüt	L	-	-	Constipation, increase milk secretion	[17]
<i>Salix alba</i> L.	Söğüt ağacı, Aksöğüt, Germajo	L	Inf	Int	Diarrhea	[19]
		L	Inf	-	Diarrhea	[18]
		L	Inf	Ext	Ticks in ruminants	[21]
		Br	Inf	Int	Gastrointestinal parasites of ruminants	[21]
		St (Ba)	Pow	Int	Tympany	[45]

Table 1. (Continued).

Santalaceae						
<i>Viscum album</i> L. subsp. <i>album</i>	Armut otu, Çam otu, Ökse otu, Gökçe, Çabu	St, L, Fr	-	Int	Respiratory diseases	[15]
		Wh	-	Int	Galactagogue (increase milk secretion)	[26]
		St, L, Fl	-	Int	Cough, endoparasites	[18]
		L	-	-	Diarrhea	[38]
<i>Viscum album</i> subsp. <i>austriacum</i> (Wiesb.) Vollm.	Gövelek, Ökse otu	L, Br	Cho	Int	Gastrointestinal parasites of ruminants	[21]
Sapindaceae						
<i>Aesculus hippocastanum</i> L.	Atkestanesi, Kestane otu	Fr	Pow	-	Pain reliever	[48]
		Fr	Pou	Int	Diarrhea, abdominal pain	[26]
Scrophulariaceae						
<i>Verbascum asperuloides</i> Hub.-Mor.	Maçyanık, Yalankı	L, Fl	Pow	Ext	Injuries, antiparasitic	[50]
		L	Pow	Ext	Antiparasitic (wounds)	[51]
<i>Verbascum cheiranthifolium</i> Boiss.	Sığırkuyruğu, Bozkulak	Aer	-	Int	Against parasites	[46]
		L	Ma	Ext	Open skin wounds	[16]
		L, Fl	Ma	Ext	Wounds	[18]
		Aer	Dec	Int	Cold	[78]
<i>Verbascum pycnostachyum</i> Boiss. & Heldr.	Ayıkulağı, Sığırkulağı	L	Dec	Int	Diarrhea	[25]
<i>Verbascum armenum</i> Boiss. & Kotschy	Deligezer	Aer	-	Int	Against parasites	[46]
<i>Verbascum phlomoides</i> L.	Sığırkuyruğu	Fl	Dec	Int	Wounds	[63]
<i>Verbascum speciosum</i> Schrad.	Majak, Ayı kulağı, Zelve, Sığır kuyruğu	Aer	Dec	Int	Worms	[44]
Solanaceae						
<i>Atropa belladonna</i> L.	Güzel avrat otu	Ro, L	-	Int	Gastrointestinal diseases, respiratory diseases	[15]
<i>Capsicum annuum</i> L.	Kırmızı biber	Fr	-	-	Increasing egg production in chickens	[17]
		Fr	-	Ext	Keratoconjunctivitis	[19]
		Fr	-	Int	Rhinitis, chicken plague	[18]
		Fr	Inf	Int	Gastrointestinal parasites of ruminants	[21]
<i>Datura stramonium</i> L.	Boruçiçeği, Abuzambak, Şeytan elması, Tatula	Fl, L, S	-	Int	Gastrointestinal diseases, respiratory diseases	[15]
<i>Mandragora officinalis</i> Mill.	Adem otu, At elması, Köpek elması, Yer elması	L	-	Int	Gastrointestinal diseases	[15]
<i>Nicotiana</i> sp.	Tütün	L	-	-	Toothache	[17]
<i>Nicotiana tabacum</i> L.	Tütün	L	Inf	Ext	Mange	[16]
		Gr	Inf	Ext	Fleas and lice, mange in ruminants	[21]
<i>Solanum lycopersicum</i> L.	Domates	Fr (sauce)	-	-	Wounds, foot-and-mouth disease	[17]
Theaceae						
<i>Camellia sinensis</i> (L.) Kuntze	Çay	L	Inf	Int	Diarrhea	[19]
		L	Inf	-	Keratoconjunctivitis, Foot-and-mouth disease diarrhea	[18]
<i>Camellia</i> sp.	Çay	L	-	-	Diarrhea	[17]
Thymelaeaceae						
<i>Daphne gnidioides</i> Jaub. & Spach	Çıgılcık, Ezeltere, İlgilcik, İyicik, Havaza	-	-	Int	Cold, tympany, anthrax	[24]
		Leb, Aer	-	Int	Swelling (digestion facilitator)	[40]

Table 1. (Continued).

<i>Daphne oleoides</i> Schreb.	Ezentere, Elentere, Boyunduruk otu	L	-	Int	Relieve any chronic pain	[39]
		-	-	Int	Cold	[24]
Ulmaceae						
<i>Ulmus canescens</i> Melville	Karangiç	Ba	Dec	Ext	Wounds	[26]
<i>Ulmus minor</i> Mill.	Karaağaç	Ro	Dec	Ext	Wounds	[28]
Urticaceae						
<i>Urtica dioica</i> L.	Isırgan	L, Ro	-	-	Abscess/fistula, wounds	[17]
<i>Urtica urens</i> L.	Isırgan otu, Küçük ısırgan otu, Tatlı ısırgan	St, Ro, S	-	Int/Ext	Reproductive diseases, dermal diseases and wounds	[15]
Vitaceae						
<i>Vitis</i> sp.	Asma, Üzüm, Tevek	L, Mo	-	-	Wounds, swelling, poisoning, pain reliever, foot-and-mouth disease, retained placenta, difficulty of birth, breast diseases	[17]
		-	-	Int	Beak blackout, malaria, nodule exanthema (LSD)	[24]
<i>Vitis vinifera</i> L.	Üzüm	Fr (Mo)	-	Ext	Ringworm	[16]
		Fr (Mo)	Dec	Ext (rub)	Mange	[19]
Xanthorrhoeaceae						
<i>Asphodelus aestivus</i> Brot.	Hidirellez kamçısı, Hint, Çiriş, Çırçıkamak	Ro	Dec	Ext	Dermal diseases	[73]
		Ro	Dec	Int	Mastitis	[45]
		Wh	Fre	-	Foot-and-mouth disease	[56]
<i>Asphodelus</i> sp.	Çiriş otu	Ro, Sh, L	-	-	Broken foot	[17]

References - Ref; Aerial parts - Aer; Ashes - As; Bran - Bn; Bud - Bd; Bark - Ba; Branch - Br; Bulb - Bl; Cone - C; Flower - Fl; Flowering branch - Flb; Fruit - Fr; Gall - Gl; Grain - Gr; Gum - Gu; Immature fruit - Imfr; Juice - Ju; Latex - Lt; Leaf - L; Leafy branch - Leb; Molasses - Mo; Pericarp - Per; Peel - Pe; Pedicel - Pd; Pollen - Po; Resin - Res; Rhizome - Rh; Root - Ro; Seed - S; Shoot - Sh; Spine - Spi; Stalk - Stk; Stem - St; Straw - Str; Tassel - Tas; Tar - Ta; Tuber - Tb; Whole plant - Wh; Wood - Wd; Added in fodder - Fd; Burned - Bur; Chewing - Che; Crushed - Cru; Chopping - Cho; Decoction - Dec; Distilled - Dis; Fresh - Fre; Heated - He; Incense - Inc; Into pellets - Inp; Infusion - Inf; Maceration - Mc; Marmalade - Mar; Mash - Ma; Ointment - Oi; Oleate - Ole; Peeled - Pel; Pickle - Pic; Plaster - Plas; Poultice - Pol; Pounded - Pou; Powdered - Pow; Pulp - Pu; Puncture - Punc; Exposed to smoke - Sm; Spice - Spi; External use - Ext; Internal use - Int; Wrapped in a cloth - Wrp.

[16,19]. Pressed bulbs with milk are used internally to relieve flatulence [32]. For ruminants, crushed bulbs are applied externally to treat mange and bulbs in pills are applied internally in the treatment of babesiosis. Moreover, bulbs are used internally for poisoning and externally for hip lameness, abscess, sunstroke, poisoning, trichophytosis, babesiosis, mange, and leeches. However, the preparation method for bulbs was not recorded [18,20,26,31]. Methanol extract of the bulbs of *A. sativum* was evaluated for its in vitro anthelmintic activity against *Haemonchus contortus* and positive results were obtained [82]. Also, an earlier report was published supporting the anthelmintic activity of this plant [83]. The ethanol extract of *A. sativum* showed various inhibition levels against *Staphylococcus aureus* and *Salmonella enteritidis* [84]. The chemical content of allicin is particularly responsible for the antibacterial effect [85]. An aqueous extract of *A.*

sativum has been shown to possess antimicrobial activity by inhibition of bacteria, yeasts, fungi, and rotavirus strains [86]. In vitro virucidal activities of allicin and other thiosulfonates were also found [87]. Bozin et al. [88] investigated the antioxidant potential of *A. sativum* by testing the extract of the whole plant with various methods and concluded that the phenolic and flavonoid contents are thought to be responsible for the antioxidant activity. Another study revealed that extracts of bulbs of *A. sativum* confirmed their ethnoveterinary usage by demonstrating antioxidant, antimicrobial, and insecticidal activity [89]. Venugopal and Venugopal [90] showed the antidermatophytic activity of the aqueous extract of *A. sativum*. According to Stoll and Seebeck [91], this plant has antibacterial, anthelmintic, and antiprotozoal activities, besides its diuretic and carminative effects. *A. sativum* oil exhibited an inhibitory effect on trypsin and

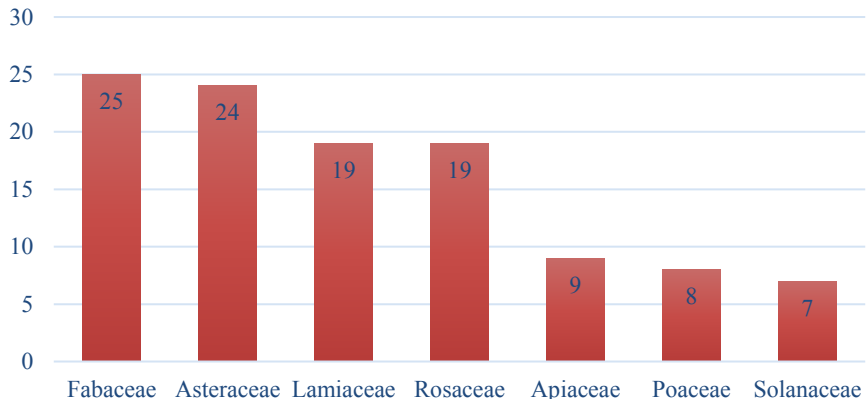


Figure 1. The most cited plant families with the numbers of medicinal plants.

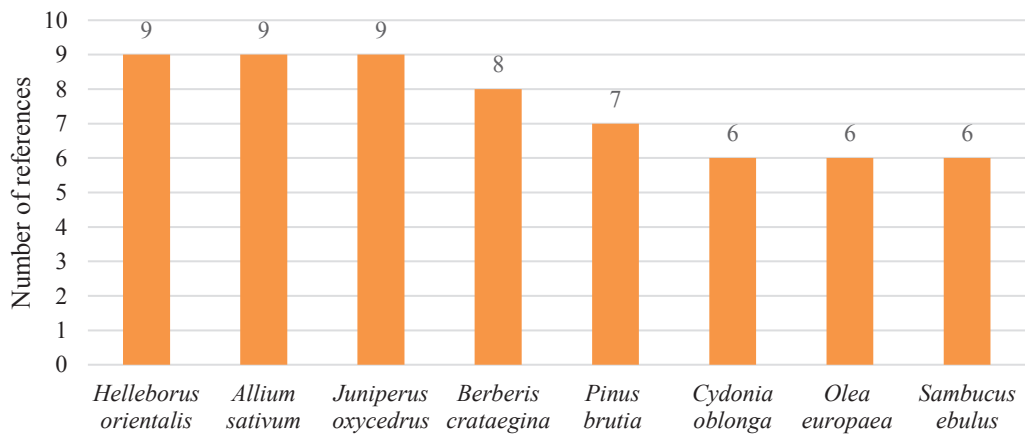


Figure 2. The most cited plants in ethnoveterinary medicine.

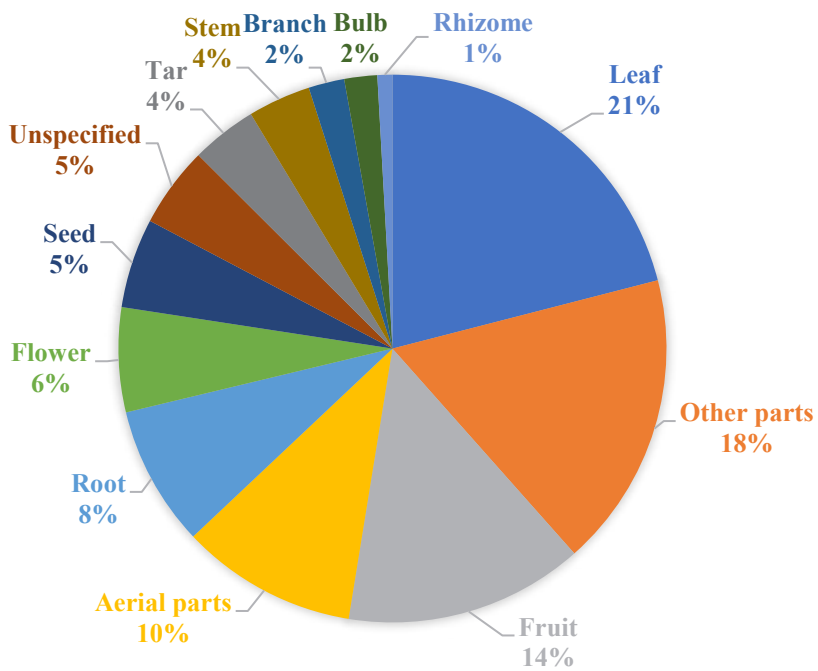


Figure 3. Plant parts used for ethnoveterinary purposes ranked by frequency of use.

Table 2. Bioactive compounds of plant families [3,119].

Family	Bioactive compounds	Family	Bioactive compounds
Acanthaceae	Alkaloids, glycosides, lignans, triterpenoid saponins, sterols, fatty acids, and coumaric acid derivatives	Lauraceae	Volatile oil, fatty oil, sesquiterpene lactones, isoquinoline alkaloids
Adoxaceae	Iridoides, flavonoids, volatile oil, caffeic acid derivatives	Linaceae	Lignans, tannins, volatile oil, fatty oil, mucilages, cyanogenic glycosides
Amaranthaceae	Triterpene saponins, flavonoids, steroids, terpenoids	Lythraceae	Tannins, alkaloids
Amaryllidaceae	Essential oils, allins, flavonoids, steroid saponins	Malvaceae	Flavonoids, mucilages, anthocyanins
Anacardiaceae	Resins, volatile oil, triterpenes, tannins	Moraceae	Flavonoids, pectins, sugars, furanocoumarins, mucilages
Apiaceae	Volatile oil, coumarins, terpenes and sesquiterpenes, triterpenoid saponins, acetylenic compounds	Myrtaceae	Volatile oil, tannins, acylphloroglucinols
Apocynaceae	Indole alkaloids, cardiac steroids, pregnane glycosides	Nitrariaceae	Alkaloids
Araceae	Anthocyanines, mucilages, lectins	Oleaceae	Iridoide monoterpene, triterpenes, flavonoids, chalcones
Araliaceae	Triterpene saponins, volatile oils, steroids, flavonoids	Orchidaceae	Mucilages, starch
Asparagaceae	Steroid saponins, benzofuranes	Papaveraceae	Isoquinoline alkaloids, anthocyanins, musilages
Asteraceae	Flavonoids, terpenoids, alkaloids, tannins, volatile oil, inulin	Pedaliaceae	Fatty oil, steroids, lignans
Berberidaceae	Isoquinoline alkaloids, anthocyanins	Pinaceae	Volatile oil, resins, terpenic acids
Betulaceae	Tannins, flavonoids, triterpenes, steroids	Plantaginaceae	Iridoide monoterpene, mucilages, flavonoids, tannins, saponins, hydroxycoumarins
Boraginaceae	Alkaloids, mucilage, tannins	Platanaceae	Flavonoids
Brassicaceae	Fatty oil, sterols, glucosinolates, phenyl propane derivatives, cardiac steroids	Poaceae	Mucilages, volatile oil, sugar alcohols, silicic acid, steroid saponins, flavonoids
Cannabaceae	Cannabinoids, flavonoids, volatile oil	Polygonaceae	Anthracene derivatives, tannins, flavonoids, glycosides
Capparaceae	Alkaloids, flavonoids, steroids, terpenoids	Portulacaceae	Flavonoids, alkaloids, terpenoids
Caprifoliaceae	Anthocyanins, iridoide monoterpene, caffeic acid derivatives	Ranunculaceae	Alkaloids, cardiac and cyanogenic glycosides
Caryophyllaceae	Anthocyanins, saponins	Rhamnaceae	Anthraquinones, saponin
Cistaceae	Tannins, glycosides, flavonoids, anthocyanins	Rosaceae	Volatile oil, tannins, terpenes, flavonoids, cyanogenic glycosides, catechins
Convolvulaceae	Cardiac glycosides, tannins, saponins	Rubiaceae	Alkaloids, iridoids, flavonoids, anthracene derivatives
Cornaceae	Iridoids, tannins, triterpenes	Rutaceae	Alkaloids, volatile oil, flavonoids, coumarins
Cucurbitaceae	Steroids, fatty oil, cucurbitacins, triterpenes	Salicaceae	Glycosides, tannins, flavonoids

Table 2. (Continued).

Cupressaceae	Volatile oil, diterpenes, catechin tannins, flavonoids	Santalaceae	Lectins, mucilages, flavonoids, lignans, triterpenes
Dennstaedtiaceae	Alkaloids, steroids, tannins, flavonoids	Sapindaceae	Triterpene saponins, hydroxycoumarins, flavonoids, tannins
Equisetaceae	Flavonoids, silicic acid, alkaloids	Scrophulariaceae	Mucilage, triterpene saponins, iridoide monoterpenes, flavonoids
Ericaceae	Monoterpenes, flavonoids, tannins	Solanaceae	Tropane alkaloids, pyridine alkaloids, hydroxycoumarins, flavonoids, tannins
Euphorbiaceae	Diterpenes, triterpenes, resins	Theaceae	Purine alkaloids, triterpene saponins, catechins, flavonoids, volatile oil
Fabaceae	Quinolizidine alkaloids, triterpene saponins, flavonoids, hydroxycoumarins, steroids, volatile oil, tannins	Thymelaeaceae	Diterpenes, hydroxycoumarins, flavonoids
Fagaceae	Catechin tannins, ellagitannins, monomeric and dimeric catechins	Ulmaceae	Steroids, sesquiterpenes, tannins
Geraniaceae	Flavonoids, tannins, glycosides, terpenoids	Urticaceae	Steroids, lectins, hydroxycoumarins, lignans
Hypericaceae	Anthracene derivatives, flavonoids, xanthenes, volatile oil, procyanidines	Vitaceae	Flavonoids, tannins, fruit acids
Juglandaceae	Tannins, flavonoids, naphthalene derivative	Xanthorrhoeaceae	Anthraquinones, flavonoids, triterpenoids
Lamiaceae	Volatile oil, tannins, coumarins, flavonoids		

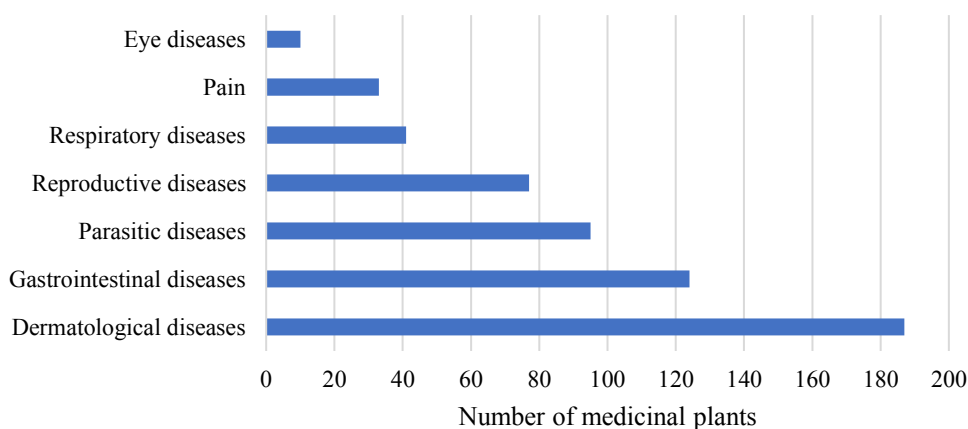


Figure 4. The most common animal diseases.

chymotrypsin, the pancreatic digestive enzymes, and it stimulated an intestinal digestive enzyme, lipase [92].

3.2.3. *Juniperus oxycedrus* L. subsp. *oxycedrus* var. *oxycedrus* (Cupressaceae)

Branches and tar are frequently cited parts of *J. oxycedrus* subsp. *oxycedrus* var. *oxycedrus* for the treatment of animal ailments. They are mainly used to treat parasitic and skin diseases. Tar is applied externally for the treatment of open skin wounds, mange, papillomatosis, ticks, and lice [16,18,21]. It is also used internally to treat ticks, colds, babesiosis, gastrointestinal parasites, and fasciolosis

[21,39,49]. While infusion of branches is used internally against gastrointestinal parasites of ruminants, it is applied externally against fleas and lice [21]. People benefit from decoction of fruit by internal use to treat cough [52]. Crushed cones are used as an appetizer by internal use [25]. In a study comparing the wound-healing effects of some plants from the family Cupressaceae, essential oil of *J. oxycedrus* subsp. *oxycedrus* showed strong wound-healing and antiinflammatory effects [93]. Antimicrobial activity with antibacterial and anticandidal effects of the methanol extract of *J. oxycedrus* was displayed [94].

Furthermore, Kozan et al. [95] revealed that the ethanolic extract of leaves and fruits of *J. oxycedrus* has remarkable in vivo anthelmintic activity.

3.2.4. *Berberis crataegina* DC. (Berberidaceae)

B. crataegina is another plant species mainly used in parasitic diseases. Infusion of roots is regarded as efficient in the treatment of cough, gastrointestinal parasites, fasciolosis, and worms by indigenous peoples [18,21,51]. Decoction of roots is used internally as an anthelmintic and antiparasitic. It is also used against dysuria [34,49,50]. Leaves and fruits are used for the treatment of respiratory diseases and reproductive diseases [15]. The usage of the plant to treat endoparasites, liver pain, and mastitis was recorded but information about used parts and preparation methods was not given in an ethnobotanical study [24]. An experimental study indicated that *B. crataegina* roots have antiinflammatory, antinociceptive, and antipyretic activity owing to berberine, berbamine, and palmatine, which are the main alkaloids [96]. The antiinflammatory, analgesic, and antipyretic effects of roots were studied in a different study and findings supporting traditional use were achieved [97]. Moreover, the methanolic extract of fruits and aerial parts exhibited significant antioxidant activity in diverse studies [98,99].

3.2.5. *Pinus brutia* Ten. var. *brutia* (Pinaceae)

Resin of *P. brutia* var. *brutia* is used externally for the treatment of wounds and cuts of animals [32,61,74]. Tar is applied externally to treat fistulas, ticks, and wounds [20,32,36]. Decoction of leaves is used for pains [42]. The usage of the plant to treat colds, enteric disorders, low birthrate, and endoparasites was mentioned but information about used parts and preparation methods was not given in the study [24]. Dıđrak et al. [100] investigated the antibacterial activity of the various extracts of the bark, resin, and cones of *P. brutia* var. *brutia* by disk diffusion method. In another study, the antimicrobial activity of tar obtained from the stems and the roots was evaluated and results showed that the crude extract of the tar had the most effective activity [101]. Essential oils obtained from resins of *P. brutia* var. *brutia* revealed in vitro antimicrobial, antioxidant, phytotoxic, and insecticidal activities [102]. On the other hand, according to Süntar et al. [103], essential oils of the cones and needles showed weak wound-healing effects in their investigation. These reports confirm the traditional utilization of tar and resin of *P. brutia* var. *brutia* for dermal and parasitic diseases.

3.2.6. *Sambucus ebulus* L. (Adoxaceae)

S. ebulus is commonly used against parasitic and dermal diseases of animals in Turkey. Aerial parts are traditionally used to treat mastitis and inflammatory swellings [27,28]. The fruit, flower, and stem are also reported as herbal medicines for gastrointestinal diseases, respiratory

diseases, dermal diseases, and wounds [15]. Leaves are prepared by different methods. Crushed leaves are used externally to treat inflamed wounds [26], and heated leaves are applied externally for chick diseases [29]. To relieve pain, animals are exposed to the smoke of the leaves [27]. Leaves and stem are also used for the treatment of chick diseases and as acaricide [30]. Studies proving these effects have been conducted by many researchers. In one of these studies, the antiinflammatory activity of leaves and roots of *S. ebulus* was demonstrated, and the antioxidant activity of flowers was investigated in another study [104,105]. In addition, herbaceous parts of *S. ebulus* were studied in terms of anti-*Helicobacter pylori* activity by using the agar dilution method [106], and wound-healing effects of the methanolic extract of leaves were found [107].

3.2.7. *Cydonia oblonga* Mill. (Rosaceae)

Fruits, leaves, and seeds of *C. oblonga* are generally used against gastrointestinal and respiratory diseases. However, its antidiarrheal activity is the best known effect in folk medicine. Infusion of leaves is administered internally to treat diarrhea and distemper [17,19,41]. Infusion of fruit peel is used to treat diarrhea [18]. Crushed seeds are used externally for the treatment of cracked nipples [16]. Furthermore, fruit and seeds are traditionally used to treat gastrointestinal diseases and respiratory diseases [15]. Regarding antidiarrheal activity, the aqueous and methanolic extracts of seeds were investigated, and the seed extract was found to contain effective compounds for constipation cases. The bronchodilator activity of the seed extract has also been demonstrated [108]. The antibacterial and antifungal activities of fruits and seed extract have been proven in many studies [109–111]. Leaves and peels were observed to have antiinflammatory effects by some researchers [112,113].

3.2.8. *Olea europaea* L. (Oleaceae)

Last but not least, *O. europaea* is one of the most cited herbs in ethnoveterinary medicine. This plant has a very broad spectrum of usage. Olive oil obtained from its fruits is used externally to treat sunstroke, sunburn, and mange [16]. It is offered as a drink for constipation in animals [19]. It is also used for the treatment of abscesses, burns, tympany, swelling, mastitis, and breast lumps [17,18]. For the treatment of gastrointestinal diseases and reproductive diseases, people also benefit from the leaves of the plant by internal use [15]. Poisoning, abdominal distention, and colds are other ailments in which *O. europaea* is used [24]. Many studies have been performed on the antioxidant, antimicrobial, antibacterial, antifungal, and antiparasitic properties of this plant. The leaves and olive oil have particularly shown these effects [114–116].

3.3. Toxicology

Some plants contain toxic components that adversely affect animal health. Overdose or side effects of these plants can

be dangerous. Therefore, particular attention should be paid to the use of them and dose adjustment should be done well. Examples of the most common toxic effects are given below.

All parts of *Nerium oleander* are toxic, and ingestion of clippings from the plant is a common cause of poisoning in animals. Among the reasons for toxicity are several cardiac glycosides. It also has a negative effect on the central and peripheral nervous systems. Massive doses (30–60 g) of the leaves may kill an animal within 1 h. Members of the family Araceae contain insoluble calcium oxalate crystals that cause pain and irritation during chewing. Some taxa of *Chenopodium* and *Rumex* also have oxalate crystals in their leaves and stems. Hypocalcemia is the most common side effect of calcium oxalates. Isocupressic acid, which is found in *Juniperus* spp., *Pinus* spp., and *Cupressus* spp., may cause premature parturition or abortion in late-term cows following internal administration. Toxic quinones and furanocoumarins are associated with the families Apiaceae, Hypericaceae, and Polygonaceae. These compounds induce photosensitization when plants are eaten in large quantities by animals. The triterpenoid saponins are quite common in Caryophyllaceae and Araliaceae. In most cases, the usage of *Hedera helix* can lead to transient diarrhea and vomiting. Moreover, severe vomiting and diarrhea have been observed in animals consuming *Sambucus ebulus*. *Beta vulgaris* causes nitrate poisoning, especially in sheep and horses. *Brassica* spp. contains S-methyl cysteine sulfoxide, which significantly reduces the number of red blood cells and packed cell volume. Diterpene esters present in *Euphorbia* spp. directly irritate the skin, mucous membranes, and gastrointestinal tract on contact. The sap is toxic in both fresh and dried plants. Blistering can cause salivation, irritation of the upper gastrointestinal tract, and diarrhea. β -Amino propionitrile exists in green parts and seeds of some *Lathyrus* spp. The early clinical signs of poisoning in animals include labored breathing and depression, followed by coma and death within a day or sometimes several days later. Diterpenoid alkaloids that are toxic to animals are found in the family Ranunculaceae (mostly in some *Delphinium* spp. and *Aconitum* spp.). Poisoning with *Helleborus* species is similar to *Digitalis* poisoning. It is characterized by effects on the cardiovascular and nervous system. Gastrointestinal tract disorders are also observed. For horses, 1 kg of *H. niger* leaf is lethal. In horses and cattle, severe poisoning occurs with 8–10 g of roots, and in sheep and goats with 4–12 g of roots. Tropane alkaloids, found in members of the family Solanaceae, are responsible for parasympatholytic action in animals. Dry mucous membranes, gastrointestinal atony and tympany, tachycardia, and convulsions may occur at low doses. *Melilotus* spp. and *Daphne* spp. contain significant

amounts of coumarin, which cause severe pain, vomiting, and collapse. Pyrrolizidine alkaloids have been identified in the family Asteraceae (*Tussilago farfara*, *Senecio* spp.). It possesses carcinogenic and mutagenic properties that may result in death [117,118].

4. Conclusion

Despite modern innovations and the development of synthetic drugs, the use of plants in ethnoveterinary medicine by local people is still continuing. Traditional herbal medicines are a common alternative in the treatment of animal diseases. However, there is insufficient evidence to conclude that traditional use of plants is beneficial to animal diseases. In this study, it was seen that most plants could be used in more than one animal disease and also various parts of the plants may be therapeutically effective. We determined the eight most popularly cited medicinal plants. Many of them are poorly studied in terms of pharmacological activity. No clinical studies have been carried out. Our study shows that *Helleborus orientalis*, *Allium sativum*, and *Juniperus oxycedrus* subsp. *oxycedrus* var. *oxycedrus* are the most cited medicinal plants for the treatment of animal diseases. Although *H. orientalis* is used to treat various animal diseases, pharmacological studies have focused solely on the antiinflammatory, antinociceptive, and antioxidant activity of the plant. Further pharmacological studies are therefore needed, particularly studies evaluating the antidiarrheal and immunostimulant activity of this species. Internal administration of plant was recorded in some ethnobotanical studies. Due to the toxic effect of this plant, further evaluation and classification of its safety is important. Clinical studies should be performed to evaluate the anthelmintic and antimicrobial properties of *A. sativum*. Our review also indicates that the most prevalent usage of plants is for wound-healing and people have usually preferred ethnoveterinary practices for dermatological diseases. Future research to clarify the wound-healing effects of medicinal plants is required. Considering the traditional usage of the reported medicinal plants, advanced in vitro and in vivo studies and clinical trials are recommended for confirming the efficacy and safety of these herbal remedies. Our data emphasize the efficacy of plants used in veterinary medicine. Thus, we hope that this review will contribute to the development of new plant-derived drugs for the treatment of animal diseases.

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