



Ethnoveterinary and fodder plants used among transhumant communities around Georgia-Turkey border, in the Western Lesser Caucasus

Ceren Kazancı, Soner Oruç and Marine Mosulishvili

Research

Abstract

Background: Livestock are an integral part of the transhumant life in the Caucasus. Maintaining the health and wellbeing of the animals has been a critical responsibility for pastoral communities. This study presents the wild plant species used for ethnoveterinary and fodder purposes by transhumant people on the both sides of Georgia-Turkey border.

Methods: During two summers (2017–2018), 119 participants were interviewed (74 in Turkey and 45 in Georgia) with semi-structured questionnaires. Cultural importance index (CI) and Relative frequency of citation (RFC) were used to evaluate the relative importance of species among communities.

Results: In total 113 citations of 38 wild plant species for ethnoveterinary purposes, and 186 citations of 61 wild plant species as fodder were obtained in the study area. The most important species in ethnoveterinary were *Veratrum album* and *Achillea millefolium* in Georgia, and *Veratrum album* and *Picea orientalis* in Turkey. Aerial parts of the plants were the most frequently used part in Georgia while the root was in Turkey. Gastrointestinal problems were the most commonly mentioned diseases in Georgia while dermatological and parasitic diseases in Turkey. The majority of the plant species were mentioned to treat the ailments of cattle (37 species). Fabaceae, Polygonaceae and Asteraceae were the most mentioned families used as fodder in both

countries. There were also several plants used as bedding for livestock and against evil eye in the study area.

Conclusions: Pastoral way of life in the Western Lesser Caucasus still reflects living evidence of plant-based traditional ethnoveterinary knowledge and practices to support the health of livestock. The results of this study could be a base for future ethnoveterinary and animal feed research and contribute to organic animal husbandry in the region.

Keywords: Ethnoveterinary, Fodder plants, Transhumant people, Traditional knowledge, the Caucasus, Cross-cultural study, Turkey, Georgia

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აბსტრაქტი

ისტორია: კავკასიაში მეცხოველეობა მწყემსების სეზონური ცხოვრების განუყოფელი ნაწილია. მწყემსებისთვის მეტად მნიშვნელოვანია ცხოველების კარგად ყოფნა და მათი ჯანმრთელობისა შენარჩუნება. ეს კვლევა ეხება მცენარეთა იმ ველურ სახეობებს, რომლებსაც მომთაბარე მწყემსები იყენებენ როგორც ეთნოვეტერინარული (სამკურნალო) მიზნებისთვის ისე ცხოველების საკვებად, საქართველო-თურქეთის საზღვრის ორივე მხარეს.

მეთოდები: ორი ზაფხულის განმავლობაში (2017–2018) ნახევრად სტრუქტურირებული კითხვარებით გამოიკითხა 119 მონაწილე (74 თურქეთში და 45 საქართველოში. კულტურული მნიშვნელობის ინდექსი - CI (Cultural importance index) და ციტირების ფარდობითი სიხშირე - RFC (Relative frequency of citation), გამოყენებულ იქნა თემებში სახეობების შედარებით მნიშვნელობის შესაფასებლად.

შედეგები: საკვლევ ტერიტორიაზე ჯამში აღრიცხული იქნა ეთნოვეტერინარული მიზნებისათვის, 38 ველური მცენარეული სახეობის - 113 ციტირება და ცხოველთა საკვებად გამოყენების, მცენარეთა 61 სახეობის - 186 ციტირება. ეთნოვეტერინარიაში ყველაზე მნიშვნელოვანი სახეობები იყო: *Veratrum album* და *Achillea millefolium* საქართველოში და *Veratrum album* და *Picea orientalis* თურქეთში. საქართველოში ყველაზე ხშირად გამოიყენებოდა მცენარეთა მიწისხედა ნაწილები, ხოლო თურქეთში - მცენარის ფესვები. საქართველოში ყველაზე ხშირად დასახელდა ცხოველთა კუჭ-ნაწლავის პრობლემები, ხოლო თურქეთში დერმატოლოგიური და პარაზიტული დაავადებები. კვლევაში მცენარეთა ყველაზე მეტი (37) სახეობა დასახელდა მსხვილფეხა რქოსანი პირუტყვის დაავადებების სამკურნალოდ. Fabaceae, Polygonaceae და Asteraceae იყო ცხოველთა საკვებად გამოიყენებული, ყველაზე ხშირად დასახელებული მცენარეთა ოჯახები - ორივე ქვეყანაში. კვლევის არეალში ასევე არსებობდა რამდენიმე მცენარე, რომლებიც გამოიყენება შინაური ცხოველების სანოლად და ავი თვალის სანინაალმდეგოდ.

დასკვნები: მცირე კავკასიონის დასავლეთ ნაწილში პასტორალური ცხოვრების წესის არსებობა - განაპირობებს მცენარეებზე დაფუძნებული ტრადიციული ეთნოვეტერინარული ცოდნის და ცხოველების ჯანმრთელობის დაცვის პრაქტიკული

გამოცდილების დღემდე შემონახვას. ამ კვლევის შედეგებმა შესაძლოა საფუძველი ჩაუყაროს ეთნოვეტერინარიისა და ცხოველთა საკვების შემდგომ კვლევებს და ხელი შეუწყოს რეგიონში ორგანული მეცხოველეობის განვითარებას.

საკვანძო სიტყვები: ეთნოვეტერინარია, ცხოველთა საკვები, მომთაბარე ადამიანები, ტრადიციული ცოდნა, კავკასია, კულტურათმორისი კვლევა, თურქეთი, საქართველო

Özet

Giriş: Kafkaslar'da hayvancılık yaylacıların yaşamının ayrılmaz bir parçasıdır. Yaylacı toplumlar için hayvanların sağlığını ve refahını korumak son derece önemli bir sorumluluktur. Bu çalışma, Gürcistan-Türkiye sınırının her iki yakasında yaşayan yaylacıların halk veterinerliğinde (etnoveterinerlik) ve hayvan yemi olarak kullandıkları yabancı bitki türlerini sunmaktadır.

Yöntemler: 2017 ve 2018 yıllarının yaz aylarında 119 katılımcıyla (Türkiye'de 74 ve Gürcistan'da 45) yarı yapılandırılmış görüşmeler gerçekleştirildi. Bilgisi alınan yabancı türlerin yaylacı toplumlar arasındaki önemini değerlendirmek için Kültürel Önem (CI) ve Göreceli Kayıt Sıklığı (RFC) indeksleri kullanıldı.

Bulgular: Çalışma alanında etnoveteriner amaçlı 38 yabancı bitki türüne ait 113, yem olarak 61 yabancı bitki türüne ait 186 kullanım kaydedildi. Hayvan hastalıklarında kullanılan en önemli türler olarak Gürcistan'da *Veratrum album* ve *Achillea millefolium*, Türkiye'de ise *Veratrum album* ve *Picea orientalis* tespit edildi. Gürcistan'da bitkilerin daha çok toprak üstü kısımları. Türkiye'de ise köklerinin kullanımı bildirildi. Gürcistan'da en çok sindirim sistemi ile ilgili sorunlar bildirilirken, Türkiye'de deri ve paraziter hastalıklar kaydedildi. Kayıt altına alınan yabancı bitki türlerinin çoğunun büyükbaş hayvanların (37 tür) rahatsızlıklarında kullanıldığı tespit edildi. Her iki ülkede de Fabaceae, Polygonaceae ve Asteraceae yem olarak kullanımı en çok bahsedilen ailelerdir. Çalışma alanında ayrıca hayvanların altına yataklık olarak serilen ve nazara karşı kullanılan birkaç bitki türü de kayıt altına alındı.

Sonuçlar: Bu çalışma, Batı Küçük Kafkasya'daki yayla yaşamında hayvanların sağlığını destekleyen bitki temelli halk veterinerliği bilgi ve uygulamalarının sürdürüldüğünün kanıtlarını yansıtmaktadır. Çalışmanın sonuçları, gelecekteki halk veterinerliği (etnoveterinerlik) ve hayvan yemi araştırmalarına temel oluşturabilir ve bölgedeki organik hayvancılığa katkı sağlayabilir.

Anahtar Kelimeler: Halk veterinerliği, Yem bitkileri, Yaylacılar, Geleneksel bilgi, Kafkasya, Kültürler arası çalışma, Türkiye, Gürcistan

Background

Livestock are an integral part of the transhumant life in the Caucasus and beyond. Maintaining and restoring the health and wellbeing of the animals has been a critical responsibility for the pastoralist communities who depended on their livestock.

Ethnoveterinary research is defined as the systematic study and application of folk knowledge and beliefs, practices that relate to any aspects of animal health (McCorkle 1986). There has been a growing interest in ethnoveterinary research in Europe (Mayer *et al.* 2014 and the references there in). This is mainly due to concerns for traditional knowledge loss, increase in antibiotic use which result in occurrence of antibiotic-resistant microbes and antimicrobial resistance both in livestock and humans, as well as potential health benefits of traditional veterinary practices on organic animal husbandry (Benítez 2012, Bartha *et al.* 2015, Mayer *et al.* 2014, Oliveira *et al.* 2020, Pieroni *et al.* 2004, 2006).

Although the studies on folk veterinary knowledge in Turkey is not new (Dinçer 1967&1980), ethnoveterinary research specific to plant-based remedies is an emerging field of study among veterinary physicians (Özen & Doğan 2017, Sinmez *et al.* 2018, Sinmez & Yaşar 2017, Yipel *et al.* 2017). Majority of the information on plant-based ethnoveterinary medicine in Turkey has been presented in ethnobotanical research (Erarslan & Kültür 2019 and the references there in). A recent review on ethnoveterinary plants highlighted a rich diversity of knowledge with 251 plant taxa used as animal medicine in Turkey (Erarslan & Kültür 2019). Similarly, ethnobotanical studies in Georgia also reported at least 75 plant species used as animal medicine and fodder (Bussmann 2017, Bussmann *et al.* 2016a, 2016b, 2017, 2018, 2020a, 2020b). However, more research is needed to reveal the full potential of the ethnoveterinary knowledge and practices in the Caucasus before they disappear.

The aims of this study were to document the wild plants used as livestock medicine and fodder by transhumant people living around Georgia-Turkey border; to evaluate the similarities and difference in ethnoveterinary knowledge and practices on both sides of the border; to compare the results of this study with the literature.

Material and Methods

Study area

The geographical area covered in this study is located along the border between Georgia and Turkey, in the Western Lesser Caucasus (Fig. 1). It falls within the borders of Adjara and Samtskhe-Javakheti regions in Georgia; and Artvin and Ardahan provinces in Turkey.

The area includes the characteristics of three of the world's ecological regions: The Caucasus Mixed Forest Ecoregion, the Euxine Colchic Deciduous Forest Ecoregion and, to a lesser extent, the Eastern Anatolian Montane Steppe Ecoregion (WWF 2006). Its principal climates range from humid subtropical and mildly dry subtropical mountainous to continental climates. Dominant natural landscapes extend from forest and high mountain vegetation to Caucasian sub-alpine meadows and steppe meadows with freshwater lakes, mainly located along the Ardahan and the Samtskhe-Javakheti border (Williams *et al.* 2006) (Fig. 2). The variety of ethnolinguistic groups inhabiting the area includes Turks, Georgians, Armenians, Kurds, Azeris, Laz people, Hemshins, and Russians, with small-scale agriculture and relatively large-scale livestock farming as their main economic activities. Nearly all participants in this study were transhumant, maintaining an agro-pastoral way of life. Highland pastures, referred to as “*yayla*” in Turkey, are known as “*mta*” and/or “*ialag*” (*iala*) in Georgia. People move to their summer pastures at the end of May, where for three to five months they live mainly in wooden houses, with some living in dry stone dwellings or even tents.

Ethnobotanical data collection

In the summer of 2016, two weeks of non-systematic preliminary fieldwork were conducted, with the undertaking of informal interviews in 20 highland pastures and villages in Georgia and Turkey (Oruç & Kazancı 2018). Over the following two summers (2017–2018), a total of around 90 days of systematic fieldwork were carried out during the period of transhumance (approximately June 15 – September 15), visiting 102 highland pastures, 65 in Turkey and 37 in Georgia (Fig. 1). During that time, 119 participants were interviewed 74 in Turkey (41 women; 33 men), and 45 in Georgia (28 women; 17 men). The mean ages of participants were 57 (from 25 to 85) in Georgia and 58 (from 25 to 95) in Turkey.

A snowball technique was used to find participants who held significant traditional knowledge regarding wild plants and their usage. The majority of the participants were elderly transhumant people. Each participant was interviewed individually, for an

average of two hours, with semi-structured questionnaires. Usually, the person's relatives and neighbors also contributed to the interview. In Turkey mother languages of the participants were Turkish, Georgian, Laz, Homshetsi or Kurdish. We conducted

the interviews in Turkish. In Georgia, mother languages of the participants were Georgian, Armenian, Russian or Azeri. Here, interviews were conducted in Georgian, Russian, or Turkish with the help of translators.

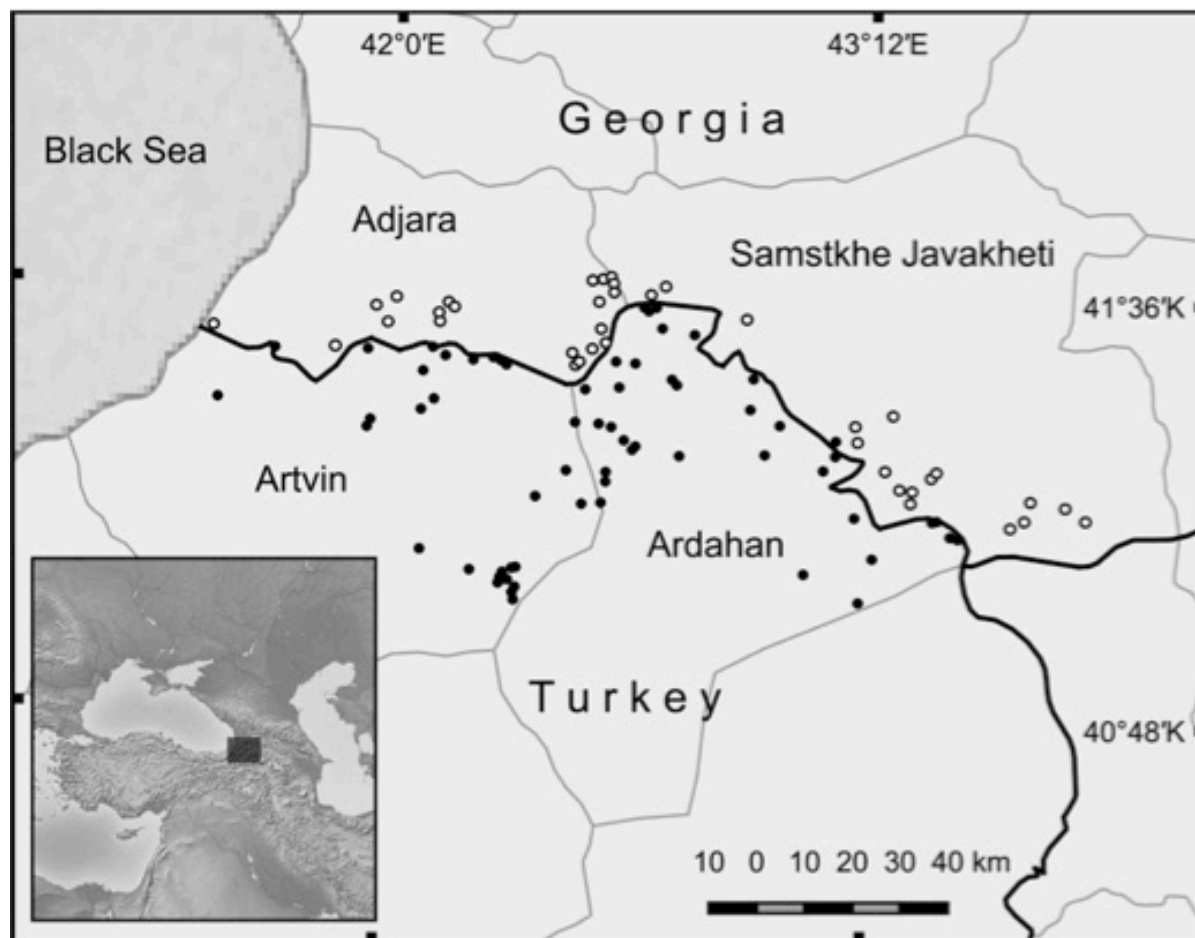


Figure 1. Map of study area showing the distribution of visited highland pastures and villages. Black dots correspond to places in Turkey; white dots refer to places in Georgia. (Map generated by Ceren Kazancı using QGIS)

The first author took notes directly in a notebook during all interviews. Depending on the participants' wishes, audio or video recordings were made of the interviews. Information about plants collected from the wild was documented, specifically with data regarding their folk names in different languages and dialects, collection time and place, parts used, purpose of use, processes of preparation, and sources of plant knowledge. In addition, observations were made, and photos were taken in byres, cellars and other relevant places whenever possible, so as to document unmentioned uses and also observe living ethnobotanical practices.

Initially, participants were asked to discuss points about wild plants that immediately came to mind (~15

min). Then they were shown fresh plants and asked to identify the vernacular names and usage of the plants (~45 min). Depending on the weather and participants' willingness, a "walk around the house" was undertaken to observe wild plants in the vicinity (~15 min). To confirm previous information and to gain further learning about various plants, participants were shown an illustrated plant catalogue, including 400 plant species from the flora of the region (~45 min.). Certain participants were visited a second time to complete the first interview or to confirm information. All interviews conformed to the International Society of Ethnobiology's Code of Ethics (ISE 2008).



Figure 2. Landscapes a) Artvin, highland houses and livestock in subalpine b) Ardahan, cattle and geese graze together in highland meadows c) Adjara, highland houses usually settled nearby forest edge d) Samstkhe-Javakheti, sheep flock nearby Kartsakhi lake.

Taxonomic Identification of plants

Preliminary identification of plant species was carried out in the field by the authors. The plants were photographed together with their coordinates and then herbarium specimens were prepared by the first author for further identification. Relevant flora resources were used for identification (Davis 1965-1985; Davis *et al.* 1988; Güner *et al.* 2000; Ketskhovali *et al.* 1971-2011; Komarov 1968-2002). Some of the species were identified through detailed plant and habitat descriptions and previously recorded folk names. Identified specimens from Georgia were stored in the National Herbarium of Georgia, specimens identified in Turkey were stored in the Herbarium of Artvin Çoruh University. Species were named based on current accepted names from the Plant List (2013). Furthermore, plant synonyms were given after Güner *et al.* (2012) and Gagnidze (2005).

Data analysis

All reported plant species and their relevant ethnobotanical data were entered into a Microsoft Excel spread sheet in a use-report (UR) based order. Each different use in every use-category counted as one UR. In this paper, ethnobotanical data of only wild (non-cultivated) plants used as ethnoveterinary, and fodder purposes as well as plants used against

evil eye for animal health care from 2017 and 2018 fieldwork were considered in the analysis. Ethnoveterinary uses include wild plants used for the treatment of gastrointestinal, dermatological, parasitic, reproductive, respiratory, musculoskeletal, and poisoning. Two indices were used to compare the relative importance of species in each country.

a) The Cultural Importance index (CI) (Pardo-de-Santayana *et al.* 2007).

$$CI = \sum_{i=1}^{i=NU} \frac{URi}{N}$$

NU: Total number of uses; i: varies from one use to NU; N: number of participants in the survey; UR: Use report.

b) Relative frequency of citation (RFC) (Tardío & Pardo-de-Santayana 2008): RFC = FC/N

FC (frequency of citation) = number of informants who mention the use of the species; N = number of participants in the survey.

Results and Discussion

In total, 113 citations (51 Georgia, 62 Turkey) of 38 wild plant species (27 Georgia, 21 Turkey) for ethnoveterinary purposes, and 186 citations of 61 wild plant species (38 Georgia, 46 Turkey) as fodder were obtained in the study area. 35 citations of 12 species (4 Georgia, 11 Turkey) were also used to protect animals against evil eye. Among recorded 88 species, 10 species in ethnoveterinary use, 23 species as fodder and 3 species used against evil eye, were common in both countries. Table 1 summarizes the information about the usage of the 88 wild plant species. Comparing 136 species-use combinations of these species, participants in both countries share similar knowledge of 34 use incidences for 28 wild plant species in common. Most important of these species are *Veratrum album*, *Trifolium* spp., *Viburnum lantana*, *Malus montana*, *Achillea millefolium*, *Sorbus aucuparia*, *Picea orientalis*, *Ruscus colchicus*, *Sambucus ebulus* and *Viscum album*. Table 1 also shows the similarities and differences between information reported in this study and reports from 14 literature sources mainly from Turkish Caucasus and South Caucasus as well as with a comprehensive review about ethnoveterinary medicine from Turkey. Of this study's 88 wild plant species and 136 species-use combinations, 50 of the plant species and only 30 of the recipes are similar to those in the mentioned literature reports. The most frequently cited species in the literature consistent with this study's reports are: *Veratrum album*, *Helleborus orientalis*, *Viscum album*, *Quercus petraea* sp. *iberica*, *Sambucus ebulus*, *Berberis vulgaris* and *Artemisia absinthium*. Common species would be indicative of consensus and high cultural value for the ethnoveterinary knowledge of certain wild plant species in the Caucasus. Moreover there are several species which have not been reported in the mentioned literature namely, *Atriplex hortensis*, *Achillea millefolium*, *Eryngium giganteum*, *Senecio* sp., *Tanacetum* sp., *Betula litwinowii*, *Sedum* sp., *Dryopteris filix-mas*, *Gentiana* sp., *Origanum vulgare*, *Picea orientalis*, *Polygonum bistorta*, *Sibbaldia parviflora* and *Sorbus aucuparia*.

For ethnoveterinary medicine, most frequently used families in Georgia are Asteraceae (8 species) and Melanthiaceae (1), whereas in Turkey they are Melanthiaceae (1 species), Rosaceae (3), and Pinaceae (1). In Georgia, the most important species are *Veratrum album* and *Achillea millefolium*, while in Turkey they are *Veratrum album* and *Picea orientalis* (Fig. 3).

Among these species, *Veratrum album* was reported throughout the study area in each administrative

region with similar usage in both countries. However, in the literature it has been reported only in Georgia (Bussmann *et al.* 2016a, 2016b, 2017, 2018, 2020a, 2020b). On the other hand, *Achillea millefolium* and *Picea orientalis* were mainly mentioned in Samtskhe-Javakheti and in Artvin respectively. Interestingly, *Achillea* and *Picea* have not been reported in the compared literature before. More work is needed for detailed evaluation of ethnoveterinary use of these species in Turkey, Georgia and the Caucasus.

Regarding the plant parts used for ethnoveterinary, aerial part (mainly with flowers) with 45% of the UR were the most frequently used part in Georgia. It is followed by root (24%) and entire plant (10%). However, root with 42% of the UR is mostly preferred in Turkey, followed by aerial part (34%) and resin (11%) (Table 2). Most of the root usage originates from *Veratrum album* to cure parasitic diseases in both countries. On the other hand, aerial part with flowers has an important role in gastrointestinal disorders in Georgia. Among the preparation methods, the most common preparation in both countries were decoction of plant in water/milk (53% of UR in Georgia, 48% in Turkey). It was followed by water infusion of the plants (22% of the UR) in Georgia, whereas poultice or plaster (26%) in Turkey. The remedies were applied mainly internally in Georgia (76% of UR), whereas externally (71%) in Turkey (Table 2).

The most cited plant species used for ethnoveterinary, fodder and against evil eye were presented in Table 3. Wild plants have important roles especially for gastrointestinal disease (53% UR) in Georgia, while dermatological (35% UR) and parasitic diseases (34%) were the most commonly mentioned problems in Turkey (Fig. 4). Almost all the plant species were mentioned to treat ailments of cattle (37 species), while 4 species were mentioned for calf, 3 species for chicken, 2 for sheep.

The most common gastrointestinal complaints and their treatments differ in both countries. In Georgia, giving a water infusion of *Achillea millefolium* aerial parts with flowers to cattle is a cure for stomachache and diarrhea, whereas in Turkey giving a water infusion of *Verbascum* sp. aerial part or a water decoction of *Sorbus aucuparia* young branches with leaves are used as wormer. The use of *Verbascum* with same purpose and application was also reported in Turkey (Altundağ 2009, Erarslan & Kültür 2019).

Table 1. Wild plants mentioned for ethnoveterinary and fodder use in the Western Lesser Caucasus.

| Latin names of families and species (collector or digital photograph number) ^a | Recorded local names ^b | Recorded plant part/s, preparation and administration ^c | Use categories ^d | Domestic animals | CI ^e | | RFC ^f | | Use in the literature ^g |
|---|--|--|---|------------------|-----------------|----------|------------------|----------|--|
| | | | | | Geo n=45 | Tur n=74 | Geo n=45 | Tur n=74 | |
| ADOXACEAE | | | | | | | | | |
| <i>Sambucus ebulus</i> L. (FP-SO 19) (CK, SO 1452, 1502) | antsli (Geo), buzyna (Rus), <i>antsli, inchiri</i> (Laz) | 1 aerial parts 2 roots, in fodder 3 roots, infusion in water, externally | fodder 1 antidote 2 stomachache 3 | cattle | 0,07 | 0,08 | 0,07 | 0,08 | 2, 9, 15 (gastrointestinal, respiratory, dermal, wound, inflammatory swelling, analgesic, mastitis, ticks, chick disease, acaricide) |
| <i>Sambucus nigra</i> L. (CK, SO 798) | didgula, dudgula (Geo), <i>denderejik</i> (Kur), <i>antsli, düldül ağacı</i> | 1 young branches with leaves | fodder 1 | cattle | – | 0,01 | – | 0,01 | 15 (antifungal, antiparasitic, wound) |
| <i>Viburnum lantana</i> L. (CK, SO 455) (CK, SO 1498, 1664, 1673, 1704) | uzani, uzni (Geo), germeşe (Tur), <i>garnavaşi, uzan, uzani, germeşe, germeşe</i> | 1 branches, hang on animals' forehead or tail, touch animal with stick of it 2 young branches with leaves, decoction in water, internally, small amount 3 young branches with leaves | belief (evil eye) 1 diarrhea 2 fodder 3 | cattle | 0,11 | 0,09 | 0,07 | 0,09 | 5 |
| <i>Viburnum orientale</i> Pall. (CK, SO 104, 532) | gelbaraca, <i>zakule</i> | 1 young branches with leaves | fodder 1 | cattle | 0,02 | – | 0,02 | – | |
| AMARANTHACEAE | | | | | | | | | |
| <i>Atriplex hortensis</i> L. (CK, SO 1535) | <i>reş pancar</i> (Kur), <i>siyah pancar, unuca</i> (Tur) | 1 aerial parts, decoction in milk, poultice | inflammation 1 | cattle | – | 0,01 | – | 0,01 | 5 (fodder) |
| APIACEAE | | | | | | | | | |
| <i>Chaerophyllum</i> sp. (CK, SO 509) | buten (Rus), ghimi, gimi (Geo), mendek, mendik, harhanduk (Arm), <i>kımı, kımı, atol</i> (Tur) | 1 aerial parts | fodder 1 | pig | 0,02 | – | 0,02 | – | 14 |

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|--|---|---|---|-----------------------------------|------|------|------|------|--------------------------|
| <i>Heracleum</i> spp. (CK, SO 470) (CK, SO 1338) | dilkha, dilgha, telaharshi (Geo), <i>kekre</i> , <i>kekro</i> (Tur-Kur), <i>dilka</i> , <i>telehaş</i> , <i>datibaba</i> , <i>kokulu pototo</i> , <i>kekro</i> | 1 aerial parts 2 aerial parts, mix with <i>Petasites</i> boil in water, internally | fodder 1, 2 increase milk production 1 | cattle | 0,07 | 0,07 | 0,07 | 0,07 | 2 (mastitis), 10, 15 |
| AQUIFOLIACEAE | | | | | | | | | |
| <i>Ilex colchica</i> Pojark. (CK, SO 74, 86) | badzgari (Geo) | 1 aerial parts | fodder 1 | goat | 0,02 | – | 0,02 | – | 2 |
| ARALIACEAE | | | | | | | | | |
| <i>Hedera colchica</i> (K.Koch) K.Koch CK, SO 84) (FP-SO 12) | suro (Geo), <i>suro</i> (Geo), <i>sici</i> (Laz) | 1 aerial parts | fodder 1 | cattle | 0,02 | 0,04 | 0,02 | 0,04 | 2, 9 |
| ASPARAGACEAE | | | | | | | | | |
| <i>Ruscus colchicus</i> Yeo (CK, SO 807) | dzmerkhli (Geo), <i>zimerkli</i> , <i>zermek</i> , <i>zermak</i> , <i>mercan otu</i> (Tur), <i>paskar</i> | 1 aerial parts | fodder 1 | cattle | 0,04 | 0,09 | 0,04 | 0,09 | 9 |
| ASTERACEAE | | | | | | | | | |
| <i>Achillea millefolium</i> L. (CK, SO 476, 495, 533) (CK, SO 1341, 1548) | hazerantertik (Arm), melagunda (Geo), besmertnik (Rus), pharsmanduki (Geo), tisiachelistnik (Rus) <i>hırpkesen</i> , <i>kılıç</i> <i>otu</i> , <i>civanperçemi</i> (Tur) | 1 aerial parts with flowers, infusion in water, internally 2 aerial parts with flowers, decoction in water, internally | diarrhea 1, 2 stomachache 1, 2 swollen stomach 2 increase milk production 2 | calf chicken cattle | 0,20 | 0,01 | 0,18 | 0,01 | |
| <i>Anthemis</i> sp. (CK, SO 27) | gvirila (Geo), romashka (Rus), papatya (Tur) | 1 flowers, decoction in water, externally | bath 1 | calf | 0,02 | – | 0,02 | – | 15 (diarrhea) |
| <i>Arctium platylepis</i> (Boiss & Balansa) Sosn ex Grossh. (CK, SO 485) (CK, SO 1387) | dzirkvena, orovandi, ghalaghunta (Geo)ghabalak, sherepuk, lopukh (Rus), <i>düğe tabanı</i> , <i>kabalak</i> (Tur), <i>dilhuna</i> , <i>hozik</i> , <i>alahunda</i> (Kur) | 1 leaves, poultice, externally 2 aerial parts | wound 1 fodder 2 | cattle rabbit | 0,02 | – | 0,02 | 0,01 | 14 (swelling of leg), 15 |

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|---|---|--|---|------------------------------------|------|------|------|------|--|
| <i>Artemisia absinthium</i> L. (CK, SO 502) | abzinda (Geo), ghelich oti, polin (Rus), <i>hevşan, pire otu</i> (Tur) | 1 aerial parts with flowers, decoction in water, internally | swollen stomach 1 | cattle | 0,02 | – | 0,02 | – | 2 (antibiotic), 3, 4 (fever), 5 (wound), 15 (parasitic disease, cold, wound) |
| <i>Cichorium intybus</i> L. (CK-SO 43) | tsikoryi (Rus), vardkachacha (Geo), <i>marçkakaç</i> | 1 aerial parts, in fodder | swollen stomach 1 | cattle | 0,02 | – | 0,02 | – | 5 (wound), 14, 15 (increasing milk production) |
| <i>Eryngium giganteum</i> M Bieb (CK, SO 486, 508) | samkbila ekala (Geo), push (Kur), <i>nazar dikenî, çakır dikenî</i> (Tur), <i>kelem</i> (Kur) | 1 aerial parts with flowers, hang in barn 2 aerial parts with flowers, decoction of 1 stem in 2lt water, internally | belief (evil eye) 1 diarrhea 2 | cattle | 0,02 | 0,03 | 0,02 | 0,03 | |
| <i>Petasites</i> spp. (FP-SO 41) | bulgo, bulgho, barambo (Geo), dilma (Geo), <i>burgvay, burgo</i> (Laz), <i>davut yaprağı</i> (Tur) | 1 aerial parts 2 aerial parts, decoction in water mix in fodder | fodder 1, 2 | cattle | 0,11 | 0,01 | 0,11 | 0,01 | 2, 10, 15 (wound) |
| <i>Senecio</i> sp. (FP-SO 42) | khboshubla (Geo), kharisshubla | 1 aerial parts with flowers, decoction in water, externally | scabby 1 | cattle | 0,02 | – | 0,02 | – | |
| <i>Tanacetum macrophyllum</i> (Waldst & Kit.) Sch Bip. syn: <i>Pyrethrum macrophyllum</i> (Waldst & Kit.) Willd. (CK, SO 37) | samthatha (Geo), <i>sandal otu, aci papatya</i> , (Tur) <i>sendel</i> | 1 aerial parts with flowers, infusion in water, internally | indigestion 1 | cattle | 0,02 | – | 0,02 | – | |
| <i>Taraxacum</i> spp. (CK, SO 69, 545) (CK, SO 1289) | babuatsvera (Geo), khatutik (Arm), <i>kaz otu, sütlü ot, hindi yemi</i> (Tur) <i>pızbizek</i> (Kur) | 1 aerial parts, raw | fodder 1 | rabbit goose chick turkey | 0,02 | 0,07 | 0,02 | 0,05 | 14 (bloody diarrhea) |
| <i>Tragopogon</i> sp. (CK, SO 494) (FP-SO 15) | phamphara (Geo), sindz (Arm), yemlik (Tur), <i>pampara, yemlik, sipink</i> (Kur) | 1 aerial parts, raw | fodder 1 | goose | – | 0,01 | – | 0,01 | |
| <i>Tussilago farfara</i> L. (FP-SO 45) (FP-SO 46) | viristerpa (Geo), barambu, porikuda, <i>dilma</i> (Geo), <i>biryüzlü yaprak</i> (Tur) | 1 leaves 2 leaves, infusion in water mix in fodder | fodder 1 increase milk production 1, 2 | cattle | 0,07 | 0,03 | 0,07 | 0,03 | 15 (inflammatory disease) |

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|--|--|---|---|----------------------|------|------|------|------|---|
| BERBERIDACEAE | | | | | | | | | |
| <i>Berberis vulgaris</i> L. (CK, SO 458, 500) (CK, SO 56, 1651, 1693) | kotsakhuri (Geo), barbaris (Rus), <i>sarılık</i> <i>ağacı karmuk</i> (Tur), <i>koçahur</i> | 1 branches with leaves 2 branches with leaves, decoction in water, internally 3 branches, hang on animals | fodder 1 antidote 2 belief (evil eye) 3 | cattle | 0,04 | 0,03 | 0,04 | 0,03 | 5 (anastaltic in injuries of horses), 8, 15 (jaundice), 7 (vascular stomatitis) |
| BETULACEAE | | | | | | | | | |
| <i>Betula litwinowii</i> Doluch. (CK, SO 22, 1590, 1695) | arki (Geo), beryoza (Rus), gechin (Arm), <i>kayın</i> (Tur), <i>arki</i> | 1 inner barks, black chewing gum, plaster | wound 1 | cattle | – | 0,01 | – | 0,01 | |
| <i>Carpinus betulus</i> L. (CK, SO 1044, 1488) | tskhmela (Geo), <i>gürgen</i> (Tur), <i>tskhemla</i> | 1 branches with leaves | fodder 1 | cattle | – | 0,01 | – | 0,01 | |
| BORAGINACEAE | | | | | | | | | |
| <i>Symphytum</i> spp. (CK, SO 474) | saro (Geo), okopnik (Rus), <i>mıtskapa</i> , gelin otu (Tur), su dodopali | 1 aerial parts | fodder 1 | cattle | 0,02 | 0,04 | 0,02 | 0,04 | |
| BRASSICACEAE | | | | | | | | | |
| <i>Capsella bursa-pastoris</i> (L.) Medik. (CK, SO 538) (CK, SO 289) | mtskemis chanta (Geo), pastushya sumka (Rus), <i>acı gıcı</i> , <i>kaz otu</i> , <i>çoban</i> <i>dürmeği</i> , <i>ördek otu</i> , <i>civciv otu</i> | 1 aerial parts | fodder 1 | goose | – | 0,08 | – | 0,08 | |
| <i>Cardamine</i> sp. (FP-SO 20, 21, 22) | <i>tere</i> (Tur), <i>tita</i> , <i>acıgıcı</i> , <i>kıçı</i> , <i>sukupiyi</i> (Laz), <i>gedim</i> (Arm) | 1 aerial parts | fodder 1 | goose | – | 0,01 | – | 0,01 | |
| BUXACEAE | | | | | | | | | |
| <i>Buxus sempervirens</i> L. | bza (Geo), <i>şimşir</i> (Tur) | 1 branches, hang on animals' forehead | belief (evil eye) 1 | cattle | – | 0,01 | – | 0,01 | |
| CONVOLVULACEAE | | | | | | | | | |
| <i>Convolvulus arvensis</i> L. (CK, SO 30) | khviara (Geo), patatuk (Arm), <i>tışhapa</i> , <i>sarmaşık</i> (Tur) | 1 aerial parts | fodder 1 | rabbit cattle | 0,02 | 0,03 | 0,02 | 0,03 | 15 (wound) |

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| CRASSULACEAE | | | | | | | | | |
| <i>Sedum</i> sp. (FP-SO 52) | tknikura (Geo), kldisvashla (Geo), saknatura (Geo), mamur (Arm), <i>ukdavra</i> , <i>katakuta</i> , <i>camış kulağı</i> (Tur), <i>hatun parmağı</i> , <i>kaya elması</i> , <i>at dişi</i> (Tur), <i>tknikura</i> | 1 aerial parts 2 aerial parts, poultice 3 aerial parts, raw | fodder 1 wound 2 internal worms 3 | chicken cattle | – | 0,05 | – | 0,03 | |
| DIPSACACEAE | | | | | | | | | |
| <i>Cephalaria gigantea</i> (Ledeb.) Bobrov (CK, SO 1015,1494) | polio (Geo), <i>kanteper</i> (Tur), <i>poliyo</i> | 1 aerial parts | fodder 1 | cattle | 0,02 | – | 0,02 | – | 14 |
| DRYOPTERIDACEAE | | | | | | | | | |
| <i>Dryopteris filix-mas</i> (L.) Schott (CK, SO 1346) | etseri (Geo), <i>blentso</i> (Laz), <i>gvimra</i> (Geo), <i>imkhri</i> , <i>etseri</i> (Geo) | 1 entire plant, dried 2 roots, internally | fodder 1 indigestion 2 | cattle | 0,09 | 0,01 | 0,09 | 0,01 | 10 |
| EQUISETACEAE | | | | | | | | | |
| <i>Equisetum arvense</i> L. (FP-SO 56) | <i>datvipanchari</i> , <i>nadzvabalakha</i> (Geo), <i>shvita</i> , <i>datvisepeta</i> , <i>kolabeşk</i> , <i>kırkkilit otu</i> , <i>atkuyruğu</i> (Tur) | 1 aerial parts | fodder 1 | cattle | – | 0,04 | – | 0,04 | 15 (bloody urination) |
| FABACEAE | | | | | | | | | |
| <i>Astracantha microcephala</i> (Willd.) Podlech <i>syn: Astragalus microcephalus</i> Willd. CK, SO 1583, 1713) | <i>geven</i> (Tur) | 1 roots, plaster, externally 2 roots, mix with hay in ploughing time (karakotan) 3 roots, decoction in water, internally 4 branches, hang on animals' forehead | wound 1 fodder 2 foot-and-mouth disease 3 belief (evil eye) 4 | cattle | – | 0,09 | – | 0,09 | 6, 7 (blacklegs) |
| <i>Trifolium alpestre</i> L. (FP-SO 58) (FP-SO 59) | <i>samkura</i> , <i>tsteli</i> <i>samkura</i> (Geo), <i>yonca</i> (Tur), <i>klever</i> (Rus), <i>uç</i> <i>kulak otu</i> (Tur), <i>samkuri</i> | 1 aerial parts | fodder 1 | cattle | 0,02 | 0,01 | 0,02 | 0,01 | |

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|--|--|---|--|--------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|---|
| <i>Trifolium ambiguum</i> M.Bieb. (FP-SO 60) | yonca, klever (Rus), yereknuk (Arm), <i>tut otu</i> , <i>üç kulak</i> (Tur) | 1 aerial parts | fodder 1 | cattle | 0,02 | 0,01 | 0,02 | 0,01 | |
| <i>Trifolium canescens</i> Willd. (FP-SO 61) | <i>tut</i> , <i>üç kulak otu</i> , <i>yonca</i> (Tur), | 1 aerial parts | fodder 1 | cattle | – | 0,03 | – | 0,03 | |
| <i>Trifolium pratense</i> L. (FP-SO 63) | samkura (Geo), yereknuk (Arm), <i>üç</i> <i>kulak</i> , <i>yonca</i> (Tur), <i>üç</i> <i>kulak</i> , <i>samkura</i> (Geo), <i>yonca</i> , <i>elma otu</i> | 1 aerial parts | fodder 1 | cattle | – | 0,03 | – | 0,03 | 10, 14 (increase milk secretion) |
| <i>Trifolium</i> sp. | samkura (Geo), klever (Rus), yereknuk (Arm), <i>yonca</i> (Tur), <i>yonca</i> , <i>samkura</i> (Geo), <i>üç</i> <i>kulak</i> , <i>kır yoncası</i> , <i>samkuri</i> , <i>üç yaprak</i> | 1 aerial parts 2 aerial parts, mix with <i>Urtica</i> , <i>Rumex</i> , <i>Anthemis</i> , flour and cream, poultice, externally | fodder 1 increase milk production 1 fracture 2 wound 2 | calf cattle | 0,18 0,18 | 0,18 0,18 | 0,18 0,18 | 0,18 0,18 | 3, 9, 12, 15 (swelling, difficulty of birth, retained plecenta, increasing milk secretion) |
| <i>Vicia villosa</i> Roth (FP-SO 64) | <i>harci</i> , <i>koranga</i> , <i>gıvartlay</i> , <i>yonca otu</i> , <i>külü</i> , <i>gül kürülü</i> (Tur) | 1 aerial parts with flowers | fodder 1 | cattle | – | 0,07 | – | 0,07 | 1 (increasing milk secretion), 10, 11, 14, 15 (gastrointestinal disease, dermal disease, wound, parasitic disease, increasing milk secretion, swelling, vitamin deficiency, difficulty of birth, retained placenta, appetizer) |
| FAGACEAE | | | | | | | | | |
| <i>Fagus orientalis</i> Lipsky. (CK, SO 1434) | <i>tsipeli</i> (Geo), <i>tsipela</i> (Geo) | 1 young branches and leaves | fodder 1 | cattle | – | 0,01 | – | 0,01 | 5, 11 |
| <i>Quercus macranthera</i> Fisch & C.A.Mey ex Hohen. (CK, SO 1796) | <i>mukha</i> (Geo), <i>pelut</i> , <i>dub</i> (Arm), <i>palut ağacı</i> (Tur) | 1 acorns, raw | fodder 1 | sheep | – | 0,01 | – | 0,01 | |
| <i>Quercus petraea</i> subsp <i>iberica</i> (Steven ex M.Bieb.) Krassiln syn: <i>Quercus iberica</i> Steven ex M.Bieb. (CK, SO 126, 259) (CK, SO 785, 1046, 1049, 1057, 1487) | <i>mukha</i> (Geo), <i>dub</i> (Arm) <i>ghoris tsabli</i> (Geo), <i>pelit</i> , <i>pelut</i> , <i>palut</i> , <i>meşe</i> (Tur), <i>ko</i> (Arm) | 1 acorns, raw 2 outer bark, decoction in water 3 young branches with leaves | fodder 1, 3 stomachache 2 | pig cattle sheep | 0,07 0,05 0,05 | 0,05 0,07 0,05 | 0,07 0,07 0,05 | 0,05 0,05 0,05 | 3, 5 (diarrhea, toothache) |

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| <i>Quercus pontica</i> K.Koch (CK, SO 72) | tkis mukha (Geo) | 1 acorns, raw | fodder 1 | pig | 0,02 | – | 0,02 | – | |
| GENTIANACEAE | | | | | | | | | |
| <i>Gentiana asclepiadea</i> L. (CK, SO 64, 93, 530) (FP-SO 65) | asistava (Geo), <i>mayasir otu</i> (Tur), <i>asistava</i> | 1 aerial parts with flowers, raw 2 aerial parts with flowers, infusion in water, internally | stomachache 1 diarrhea 2 | cattle | 0,02 | 0,01 | 0,02 | 0,01 | |
| HYPERICACEAE | | | | | | | | | |
| <i>Hypericum bupleuroides</i> Griseb. (CK, SO 47) | <i>tiknikuda</i> | 1 entire plant | fodder 1 | lamb | 0,02 | – | 0,02 | – | |
| <i>Hypericum perforatum</i> L. (CK, SO 475) (CK, SO 1480) | krazana (Geo), zveroboy (Rus), <i>sarı çiçek, kaymak çiçeği, sarı kanataron, mayasıl otu</i> (Tur) | 1 aerial parts with flowers, dried and powdered, poultice | wound 1 | cattle | – | 0,01 | – | 0,01 | 15 (gastrointestinal, respiratory, dermal disease, mastitis) |
| JUNCACEAE | | | | | | | | | |
| <i>Juncus</i> sp. (CK, SO 34, 65) | dzrokhis balakhi (Geo), tchilophi (Geo), <i>cil</i> (Tur), <i>çilopay</i> | 1 aerial parts | fodder 1 | cattle | 0,02 | – | 0,02 | – | |
| LAMIACEAE | | | | | | | | | |
| <i>Mentha longifolia</i> (L.) L. (CK, SO 683) | tentso (Geo), veluri pitna (Geo), pitna (Geo), daghdz (Arm), nana, gareuli pitna (Geo), <i>yarpuz</i> (Tur), <i>tentso, pitna</i> (Geo), <i>yabani nane, nane</i> (Tur), <i>punk</i> (Kur) | 1 aerial parts with flowers, decoction in water, externally | foot-and-mouth disease 1 wound 1 | cattle | – | 0,03 | – | 0,03 | 15 (parasitic, reproductive, respiratory disease, diarrhea) |
| <i>Origanum vulgare</i> L. (CK, SO 478) (CK, SO 1283) | tavshava (Geo), dushitza (Rus), marmichi (Geo), urtz (Arm), <i>çay otu, çam çayı, kekik</i> (Tur) | 1 aerial parts with flowers, infusion in water, internally 2 aerial parts with flowers, in fodder | diarrhea 1 stomachache 2 fodder 2 | cattle | 0,04 | 0,01 | 0,04 | 0,01 | |
| <i>Salvia glutinosa</i> L. (CK, SO 51, 95) | purçumela (Laz), <i>adaçayı, purçumela</i> (Laz), <i>purşukuna</i> | 1 young aerial parts | fodder 1 | cattle | 0,02 | – | 0,02 | – | |

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| MELANTHIACEAE | | | | | | | | | |
| <i>Veratrum album</i> L. (CK, SO 52) (CK, SO 1546) | shkhama (Geo), shkhami, aputaraki (Geo), <i>şikhami</i> , <i>abitarat</i> , <i>abutarat</i> (Geo), <i>çoplama</i> , <i>şamay</i> , <i>avu</i> , <i>camışkiran</i> (Tur) | 1 aerial parts, dried 2 roots, decoction in water, bath, externally 3 entire plant, decoction in water, bath 4 roots, decoction in water, internally | fodder 1 scabby 2 wound 2 lice 2 mastitis 2 stomachache 4 internal worms 4 indigestion 4 constipation 4 | sheep cattle | 0,27 | 0,34 | 0,27 | 0,34 | 2, 3, 4, 9, 12 |
| OLEACEAE | | | | | | | | | |
| <i>Fraxinus angustifolia</i> subsp <i>oxycarpa</i> (Willd.) Franco & Rocha Afonso (CK, SO 1482) | ipni (Geo), <i>dişbudak</i> (Tur), <i>ipni</i> (Geo) | 1 young branches and leaves | fodder 1 | cattle | – | 0,01 | – | 0,01 | 15 (chicken disease) |
| PAPAVERACEAE | | | | | | | | | |
| <i>Chelidonium majus</i> L. (FP-SO 70) | khristesiskhla (Geo) | 1 aerial parts, poultice | stop bleeding 1 | cattle | 0,02 | – | 0,02 | – | 9, 15 (liver disease) |
| PINACEAE | | | | | | | | | |
| <i>Picea orientalis</i> (L.) Peterm. (CK, SO 110, 446) (CK, SO 658, 1041, 1676) | nadzvi (Geo), yolka (Rus), <i>ladin</i> (Tur), <i>nadzvi</i> (Geo) | 1 resin, mix resin with butter and spores of puffball mushroom, (guda soko) 2 resin, salve, mix with beeswax, olive oil, butter | wound 1 , 2 foot-and-mouth disease 1 | cattle | 0,04 | 0,09 | 0,02 | 0,09 | |
| <i>Pinus sylvestris</i> var <i>hamata</i> Steven syn: <i>Pinus sosnowskyi</i> Nakai (CK, SO 77, 447) | pichvi (Geo), kataris pichvi (Geo), sosna (Rus), katari (Geo), <i>çam</i> , <i>sarıçam</i> (Tur), <i>katari</i> , <i>pichvi</i> (Geo) | 1 young seed cones | fodder 1 | pig | 0,02 | – | 0,02 | – | 5, 15 (wound, insect repellent) |

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| PLANTAGINACEAE | | | | | | | | | |
| <i>Plantago major</i> L. (CK, SO 515, 535) (CK, SO 53, 1563) | mravaldzargya (Geo), podoroznik (Rus), yezani lezu (Arm), <i>bağa yaprağı, yedi damar</i> (Tur), <i>ohne damar, şvit damari, belhavis, belhebis</i> (Kur), <i>yara yaprağı, balarzarghva, sinirli ot, damarlı ot</i> (Tur), <i>belhebis</i> | 1 entire plant, decoction in water, internally 2 leaves, poultice, externally | diarrhea 1 wound 2 | cattle | 0,02 | 0,01 | 0,02 | 0,01 | 15 (abscess, wound) |
| POACEAE | | | | | | | | | |
| <i>Phragmites australis</i> (Cav.) Trin ex Steud. (CK, SO 63) | gamuş, <i>kamış, saz otu</i> (Tur) | 1 aerial parts | fodder 1 | cattle | 0,02 | – | 0,02 | – | |
| POLYGONACEAE | | | | | | | | | |
| <i>Polygonum aviculare</i> L. (CK, SO 300) | matitela (Geo), gushina gashka, cancar (Arm), gorets sporish (Rus), <i>kuş ekmeği, kuş otu, kuş pancarı, kuş pepeği, kuş pepesi, madımak, madımalak</i> (Tur), <i>matitel</i> (Geo), <i>pencer, telce</i> (Tur) | 1 aerial parts | fodder 1 | cattle chicken duck | 0,07 | – | 0,07 | – | 5 |
| <i>Polygonum carneum</i> K Koch syn: <i>Polygonum bistorta</i> subsp <i>carneum</i> Coode & Cullen (CK, SO 68) | dvaluri (Geo), dvalura (Geo), <i>çayır pancarı, dağ pancarı, kızılıcak pancarı, pancar otu, pazı pancarı, pencar, yabani pancar, yayla lahanası, yayla pancarı</i> (Tur), <i>ğali, tiphala, dvaluri</i> (Geo), <i>yaylaşi luku</i> (Laz) | 1 aerial parts | fodder 1 give easy birth 1 | cattle | 0,09 | – | 0,09 | – | |

| | | | | | | | | | |
|--|--|--|---|---------------------|------|------|------|------|--|
| <i>Polygonum cognatum</i> Meisn. syn: <i>Polygonum alpestre</i> C.A.Mey. (FP-SO 72) | matitela (Geo), cancar (Arm), madımak (Tur), kuş ekmeği, kuş pepesi, kuş otu, kuş pancarı (Tur), matitel (Geo), paluği cuçki (Kur) | 1 leaves, in yoghurt | fodder 1 | gosling | – | 0,01 | – | 0,01 | |
| <i>Rumex alpinus</i> L (CK, SO 70) (CK, SO 654) | ghvalo (Geo), poliyo, gvalo, öküz tırşosu, yabani evelik, palak yaprağı (Tur) | 1 aerial parts | fodder 1 | cattle | 0,02 | 0,01 | 0,02 | 0,01 | 2 |
| <i>Rumex crispus</i> L. (CK, SO 654, 776) | aveluk (Arm), ghvalo (Geo), övelik, evelik evelek (Tur), ghvalo (Geo) | 1 aerial parts | fodder 1 | cattle | – | 0,01 | – | 0,01 | 5 (antidiarrheal) |
| <i>Rumex</i> sp. (CK, SO 1511) | kokomzhava (Geo), ghvalo (Geo), ghvalo, peçek, palak, poliyo, kukumjava | 1 aerial parts | fodder 1 | goose cattle | 0,02 | 0,09 | 0,02 | 0,09 | |
| POLYPODIACEAE | | | | | | | | | |
| <i>Pteridium aquilinum</i> (L.) (CK, SO 91, 514) | etsris gvimra (Geo), tabela, bilançro (Laz) | 1 roots, dry in fodder 2 aerial parts, dried | indigestion 1, 2 fodder 2 | cattle | 0,04 | 0,01 | 0,04 | 0,01 | 15 (urinary disease, analgesic) |
| RANUNCULACEAE | | | | | | | | | |
| <i>Helleborus orientalis</i> Lam. | kharadzira (Geo), halazina, dabak otu (Tur) | 1 roots, raw in fodder 2 roots, hang on throat of animals 3 entire plant, decoction in water, externally | inflammation 1, 2 foot-and-mouth disease 3 | cattle | – | 0,04 | – | 0,03 | 2 (wound), 3, 4, 12 (bad liquid, gas, wounds), 9 (cleans blood of cattle), 15 (antipyretic, analgesic, sunstroke, joint ailments, cold, diarrhea, mastitis, keratitis, malaria, edema, aphrodisiac, animal weakness, immuno stimulant) |
| RHAMNACEAE | | | | | | | | | |
| <i>Paliurus spina-christi</i> Mill. (CK, SO 8, 18) | karadiken (Tur) | 1 branches, hang on animals forehead | belief (evil eye) 1 | cattle | – | 0,03 | – | 0,03 | 15 (mastitis) |

| ROSACEAE | | | | | | | | | |
|---|--|--|---|-----------------------------------|------|------|------|------|---|
| <i>Alchemilla sp.</i> (CK, SO 33, 519) | marmuchi (Geo), <i>yağlı ot, sütlü ot, ayı pençesi, aslan pençesi</i> (Tur) | 1 aerial parts, in fodder | increase milk production 1 | cattle | 0,02 | 0,04 | 0,02 | 0,04 | 1, 15 |
| <i>Crataegus monogyna</i> Jacq syn: <i>Crataegus kyrtostyla</i> Fingerh. (CK, SO 1784) | tsiteli kuneli (Geo), kirkat, kurkantela (Geo), alucha (Arm), <i>kırkat, aliç</i> (Tur), <i>at götü</i> | 1 branches, hang on animals' forehead | belief (evil eye) 1 | cattle | – | 0,01 | – | 0,01 | 15 (gastrointestinal, reproductive disease, snake bite) |
| <i>Malus montana</i> Uglitzk. (CK, SO 445) | veluri vashli (Geo), <i>acı elma, piç elma, kına tura, meşe elması, yabani elma</i> (Tur) | 1 branches, hang on animals forehead | belief (evil eye) 1 | cattle | 0,04 | 0,12 | 0,04 | 0,12 | 15 (difficulty of birth, increase milk secretion) |
| <i>Prunus avium</i> (L.) L. syn: <i>Cerasus avium</i> (L.) Moench (CK, SO 33, 859, 1061, 1445, 1662) | veluri bali, gareuli bali (Geo), <i>yabani kiraz, bali, aci kiraz</i> (Tur), <i>mir kirazi</i> | 1 branches, hang on animals' forehead | belief (evil eye) 1 | cattle | – | 0,03 | – | 0,03 | 1 (diarrhea), 15 (intestinal disease) |
| <i>Prunus divaricata</i> Ledeb. (CK, SO 453, 459, 464) | tkemali (Geo), cancur (Arm), <i>sarol, temal, tkemali</i> (Geo), <i>muş, çançur, yabani erik</i> (Tur) | 1 fruits, raw | swollen stomach 1 | cattle | 0,02 | – | 0,02 | – | 15 (wound, gastrointestinal parasite) |
| <i>Pyrus communis</i> L. (CK, SO 450, 462) | panta (Geo), <i>yaban armudu</i> (Tur), <i>panta</i> | 1 branches, hang on animals' forehead | belief (evil eye) 1 | cattle | 0,02 | – | 0,02 | – | |
| <i>Rosa spinosissima</i> L. syn: <i>Rosa pimpinellifolia</i> L. (CK, SO 24, 1019, 1024, 1529, 1669, 1711) | shavi askili (Geo), masur (Arm), shipovnik (Rus), <i>kara tiken, kara esgül, kara kuşburnu</i> (Tur), <i>şilan</i> (Kur) | 1 branches, hang on animals' forehead | belief (evil eye) 1 | cattle | – | 0,01 | – | 0,01 | |
| <i>Sibbaldia parviflora</i> Willd. | <i>yağlı ot</i> (Tur) | 1 aerial parts with flowers, in fodder | increase milk production 1 | cattle | – | 0,03 | – | 0,03 | |
| <i>Sorbus aucuparia</i> L. syn: <i>Sorbus caucasigena</i> Kom ex Gatsch. (CK, SO 75, 456) (CK, SO 1459, 1591, 1660) | mchknavi (Geo), <i>çıknavi, cinav, ayı kakası</i> (Tur) | 1 young branches with leaves, in fodder 2 fruits, raw 3 young branches with leaves, decoction in water, internally | increase milk production 1 fodder 1, 2 worm 3 stomach-ache 3 | chicken cattle calf | 0,16 | 0,04 | 0,16 | 0,03 | |

| | | | | | | | | | |
|--|---|--|---|-----------------|------|------|------|------|--|
| SALICACEAE | | | | | | | | | |
| <i>Salix caprea</i> L. (CK, SO 82, 98, 506, 522) (CK, SO 1034) | mdgnali (Geo), tsitsela (Geo), mdgnali (Geo), yabani sōğüt, tüylü sōğüt (Tur) | 1 young branches with leaves | fodder 1 | cattle | 0,02 | 0,01 | 0,02 | 0,01 | 3, 4 |
| <i>Salix</i> sp. (CK, SO 208) | tiriphi (Geo), dzetsni (Geo), sōğüt, köy sōğüdü, meşe sōğüdü, su sōğüdü (Tur) | 1 young branches with leaves | fodder 1 | cattle | 0,04 | – | 0,04 | – | 15 (constipation, increase milk secretion) |
| SANTALACEAE | | | | | | | | | |
| <i>Viscum album</i> L. (FP-SO 5) | phitri (Geo), pintri, fitri (Geo), çaabu (Laz) | 1 entire plant, in fodder 2 entire plant, infusion in water, internally | get easy birth 1 fodder 1 cough 2 | cattle | 0,09 | 0,07 | 0,09 | 0,07 | 10 (diarrhea), 11, 15 (respiratory disease, increasing milk secretion, cough, endoparasites, diarrhea, gastrointestinal parasites) |
| SAPINDACEAE | | | | | | | | | |
| <i>Acer campestre</i> L. (CK, SO 79) | leki nekerchkhali (Geo), leki | 1 young branches with leaves | fodder 1 | cattle | 0,09 | 0,01 | 0,09 | 0,01 | |
| <i>Acer heldreichii</i> subsp <i>trautvetteri</i> (Medw.) A.E.Murray (CK, SO 444) | leki (Geo), nekerchkhali (Geo), eki (Geo) | 1 young branches with leaves 2 branches, hang on animals' forehead | fodder 1 belief (evil eye) 2 | cattle | 0,02 | 0,05 | 0,02 | 0,05 | |
| <i>Acer platanoides</i> L. (CK, SO 1481) | leki, nekerchkhali (Geo), leki, korapi (Geo) | 1 young branches with leaves | fodder 1 | cattle | 0,02 | – | 0,02 | – | |
| SCROPHULARICEAE | | | | | | | | | |
| <i>Verbascum</i> spp. (CK, SO 1547, 1592) | marjerk, mavuljak, öküzkuyruğu (Tur) | 1 aerial parts with flowers, infusion in water, internally 2 aerial parts with flowers, infusion in water, externally | worms 1 lice 2 | sheep cattle | – | 0,03 | – | 0,04 | 14 (worms), 15 (injuries, antiparasitic, wound, cold, diarrhea, worms) |
| TYPHACEAE | | | | | | | | | |
| <i>Typha</i> sp. | cil otu, çil (Tur) | 1 aerial parts | fodder 1 | cattle | – | 0,01 | – | 0,01 | |
| ULMACEAE | | | | | | | | | |
| <i>Ulmus glabra</i> Huds. | tela (Geo), kara ağaç, karağacı, moşi, morkan ağacı (Tur) | 1 young branches with leaves | fodder 1 increase milk production 1 | cattle | – | 0,04 | – | 0,04 | 10 |

| URTICACEAE | | | | | | | | | |
|---|---|---|--------------------|---|------|------|------|------|---|
| <i>Urtica dioica</i> L. CK, SO 510 (CK, SO 1526) | krapiva (Rus), chinchari (Geo), aghinch, yeghinch (Arm), kecan, <i>ısrıgan</i> (Tur), <i>çinçar, cinçar</i> (Geo), <i>ağınç</i> (Arm), <i>gezgezik</i> (Kur), <i>dıçkıcı</i> (Laz) | 1 aerial parts 2 aerial parts, mix with <i>Polygonum</i> <i>bistorta</i> , <i>Symphytum</i> , <i>Heracleum</i> and boil them before mix in fodder | fodder 1, 2 | cattle pig chicken goose | 0,07 | 0,04 | 0,02 | 0,04 | 2, 3, 4, 5, 10, 15 (abscess, wound) |
| <i>Urtica urens</i> L. | <i>yabani ısrıgan</i> (Tur) | 1 aerial parts | fodder 1 | turkey | – | 0,01 | – | 0,01 | 15 (reproductive disease, dermal disease, wound) |

^a “CK, SO (number)”: Collection number of species “FP-SO (number)”: Field photo number of the specimen **Bold** numbers indicate specimens from Georgia, the others from Turkey.

^b Recorded local names of species in both countries during the fieldwork Names written in *Italics* are from Turkey, the rest are from Georgia Arm: Armenian, Geo:Georgian, Kur: Kurdish, Laz: Laz language, Tur:Turkish, Rus: Russian.

^c Each different number (1,2,3...) indicates a plant part used in a remedy

^d Numbers written in **bold** are shared reports between participants in both countries, *Italics* are associated with the recipes from Turkey, the rest are from Georgia Each number (1,2,3...) in the use category match with the plant parts used.

^e Cultural importance value (CI) of species in Georgia (Geo) and in Turkey (Tur) “n” indicates the participant number of each country.

^f Relative requery of citation (RFC) values of species in Georgia (Geo) and in Turkey (Tur).

^g Numbers and its corresponding references: **(1)** Akbulut *et al* 2014, **(2)** Bussmann *et al* 2018, **(3)** Bussmann *et al* 2016a, **(4)** Bussmann *et al* 2016b, **(5)** Bussmann 2017, **(6)** Güneş & Özhatay 2011, **(7)** Macit & Köse 2015, **(8)** Sezik *et al* 1997, **(9)** Bussmann *et al* 2020b, **(10)** Saraç *et al* 2013, **(11)** Bussmann *et al* 2020a, **(12)** Bussmann *et al* 2017 **(13)** Sezik *et al* 1991, **(14)** Altundağ 2009, **(15)** Eraslan & Kültür 2019

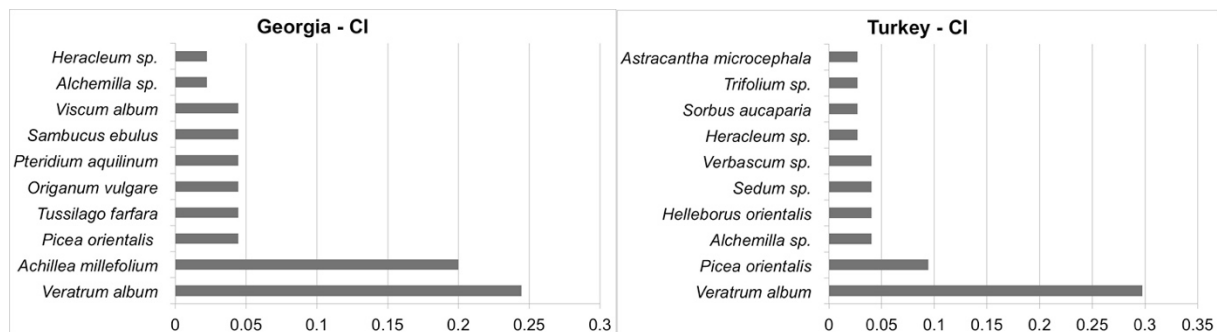


Figure 3. Cultural importance (CI) index of the 10 most important species used in ethnoveterinary medicine in each country.

Table 2. Comparison of UR (%) for plant parts used, preparations, and applications for ethnoveterinary purposes in Georgia and in Turkey.*

| Plant parts used | UR (%) Geo | UR (%) Tur | Preparations | UR (%) Geo | UR (%) Tur |
|----------------------------|---------------|---------------|--------------------------|-----------------------|-----------------------|
| roots | 23,53% | 41,94% | decoction in water/milk | 52,94% | 48,39% |
| aerial parts with flowers | 29,41% | 12,90% | dried or raw in fodder | 19,61% | 17,74% |
| aerial parts | 15,69% | 20,97% | poultice or plaster | 5,88% | 25,81% |
| resin | 3,92% | 11,29% | infusion in water | 21,57% | 6,45% |
| entire plant | 9,80% | 1,61% | hang on throat of animal | – | 1,61% |
| leaves | 5,88% | 4,84% | Applications | UR (%) Geo | UR (%) Tur |
| young branches with leaves | 3,92% | 4,84% | internally | 76,47% | 29,03% |
| fruits | 3,92% | 0,00% | externally | 23,53% | 70,97% |
| flowers | 1,96% | 0,00% | | | |
| inner barks | – | 1,61% | | | |

* Note that the information (words) in each row do not match with each other (See in Table 1 for the preparation and application of each plant part). Information was ranked in accordance of importance based on mean UR (%) values of the countries.

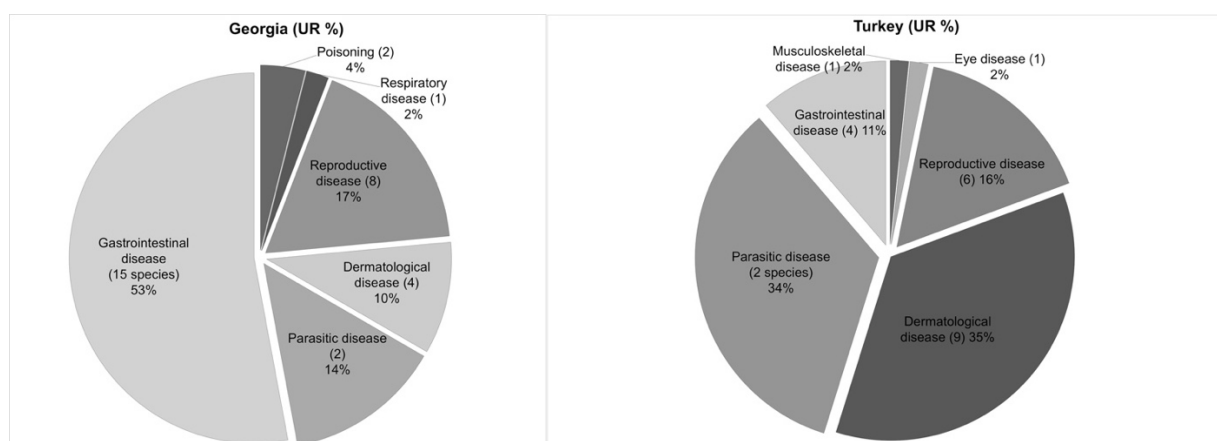


Figure 4. Percentage of use reports (UR%) and number of species for each ethnoveterinary use category in each country.

The most common gastrointestinal complaints and their treatments differ in both countries. In Georgia, giving a water infusion of *Achillea millefolium* aerial

parts with flowers to cattle is a cure for stomachache and diarrhea, whereas in Turkey giving a water infusion of *Verbascum* sp. aerial part or a water

decoction of *Sorbus aucuparia* young branches with leaves are used as wormer. The use of *Verbascum* with same purpose and application was also reported in Turkey (Altundağ 2009, Erarslan & Kültür 2019).

Related to dermatological problems, *Picea orientalis* is the most important plant for wound healing in animals in both countries. Macerated resin of *Picea orientalis*, locally called “*pisî*”, is mixed with butter and spores of puffball mushroom, and applied as a plaster for any kind of wound and foot-and-mouth disease in both countries. One unique report from Turkey also describes using it in a homemade wound healing salve, a mixture of *Picea* resin, beeswax, butter and olive oil, which is used for foot-and-mouth disease.

Table 3. The most cited species for ethnoveterinary, fodder and against evil eye use in each country.

| | Georgia (UR) | Turkey (UR) |
|---------------------------------|-----------------|----------------|
| Fodder | | |
| <i>Trifolium</i> spp. | 9 | 18 |
| <i>Rumex</i> spp. | 2 | 9 |
| <i>Acer</i> spp. | 7 | 4 |
| <i>Ruscus colchicus</i> | 2 | 7 |
| <i>Quercus</i> spp. | 3 | 5 |
| <i>Sambucus ebulus</i> | 1 | 6 |
| <i>Viscum album</i> | 2 | 5 |
| <i>Urtica dioica</i> | 3 | 4 |
| <i>Polygonum</i> spp. | 6 | 1 |
| <i>Sorbus aucuparia</i> | 6 | 1 |
| <i>Capsella bursa-pastoris</i> | – | 6 |
| <i>Taraxacum</i> sp. | 1 | 5 |
| <i>Petasites</i> sp. | 5 | 1 |
| Belief (evil eye) | | |
| <i>Malus montana</i> | 2 | 9 |
| <i>Viburnum lantana</i> | 4 | 6 |
| Gastrointestinal disease | | |
| <i>Achillea millefolium</i> | 8 | 1 |
| <i>Veratrum album</i> | 4 | – |
| Dermatological disease | | |
| <i>Picea orientalis</i> | 2 | 7 |
| <i>Helleborus orientalis</i> | – | 3 |
| Parasitic disease | | |
| <i>Veratrum album</i> | 6 | 20 |
| Reproductive disease | | |
| <i>Alchemilla</i> sp. | 1 | 3 |
| <i>Heracleum</i> sp. | 1 | 2 |
| <i>Tussilago farfara</i> | 2 | 1 |

A decoction of *Astracantha microcephala* root or whole *Helleborus orientalis* was also mentioned to cure foot-and-mouth disease in Turkey.

For parasitic diseases, *Veratrum album* was major plant mentioned for the treatment of lice and scabby in both countries. Sheep and cattle with scabies are bathed in the decoction of *Veratrum album* roots.

The extent of similar naming and use of *Veratrum album* roots against ectoparasites in the whole study regions presents the special cultural value of the species in the Caucasus. This appears to be related to consensus on therapeutic efficacy of the species to cure parasitic symptoms of cattle and sheep.

The other traditional ethnoveterinary knowledge and practices in the study area were related to reproductivity, respiratory, musculoskeletal and poisoning in livestock.

Raw use of *Viscum album* or *Polygonum bistorta* in fodder was mentioned to ease birth in Georgia. *Alchemilla* sp., *Heracleum* sp. and *Tussilago farfara* were mentioned to increase milk production in both countries. Decoction of *Veratrum album* roots was stated to cure mastitis in Turkey. In addition, *Viscum album* was mentioned for cough in Georgia. In Turkey, *Trifolium* spp. was mentioned for fracture. Regarding poisoning, tea of *Berberis vulgaris* branches with leaves, and roots of *Sambucus ebulus* in fodder are known as antidote in Georgia.

Among the wild plants used as fodder, Fabaceae, Polygonaceae and Asteraceae were most mentioned families in both countries. *Trifolium* spp. is the most widely used plant as fodder in both countries. *Rumex* spp., *Ruscus colchicus*, *Sambucus ebulus*, *Capsella bursa-pastoris* follows it in Turkey. While in Georgia, *Acer* spp., *Polygonum* spp., *Sorbus aucuparia* and *Petasites* sp. are preferred. Among them, collecting and adding aerial parts of *Ruscus colchicus*, *Viscum album*, *Sambucus ebulus*, and *Sorbus aucuparia* to cattle's fodder as nutraceutical appear to be specific to Adjara and Artvin.

Use of *Ruscus colchicus* as fodder for cattle has also been reported in Georgia (Bussmann *et al.* 2020b, Bussmann 2017). *Ruscus colchicus* was reported as an excellent food plant due to its benefits on high milk yield (Khidasheli & Papunidze 2014). Shared ethnoveterinary knowledge and practices of the communities for this species called with the same local names might be related to the similar cultural background of the communities living in these regions.

The popularity of some species exclusively in Ardahan could be related to existence of variety of livestock in the region. For instance, *Polygonum cognatum*, *Capsella bursa-pastoris*, *Rumex* spp., and *Tragopogon* species were mentioned for raising geese in Ardahan. This tradition might contribute to the diversification of ethnoveterinary knowledge and practice in the study area.



Figure 5. Young branches and leaves of trees and shrubs harvested to feed the cattle on the road to plateau in Artvin, Turkey.



Figure 6. Animal fodder prepared by cooking mix wild plants in Adjara, Georgia

Some species have indirect veterinary uses for the well-being of livestock, such as those used as bedding to protect them against colds and serious diseases, and against evil eye. It was reported that the above-ground parts of *Dryopteris filix-mas* and *Pteridium aquilinum* species were covered on the floor of the barn to protect the animals from cold in Adjara and Artvin, and then used as fertilizer for

vegetable gardens. Plants used against evil eye constitute 10% of the URs with 12 species in the study area. *Viburnum lantana* and *Malus montana* were the most mentioned species in both countries. It is believed that branches of these species hanged on cattle's forehead protect them from illnesses. The use of *Viburnum lantana* against evil eye in cattle has also been reported in Georgia (Bussmann *et al.*

2020b, Bussmann 2017). *Viburnum lantana* is used mostly in Adjara and Artvin. This commonality might also be connected with similar cultural ties of the communities in Adjara and Artvin.

In sum, we found few difference in plants used in ethnoveterinary and fodder purposes between transhumant communities on both sides of Georgia-Turkey border. The similarities may be related to the similar environmental conditions across the border or historical contact of the communities especially before the current position of the border was established in 1921, or more likely the common cultural background of majority of the participants may have resulted in many similarities. They are mostly apparent between Artvin and Adjara where the participants have same mother language (Georgian), share common cultural background and having ongoing cultural ties.

Conclusions

The findings of this study suggest that pastoral way of life in the Western Lesser Caucasus still reflects living evidence of plant-based traditional ethnoveterinary knowledge and practices to support the health of livestock. We found few difference in plants used in ethnoveterinary between communities on both sides of Georgia Turkey border. There seems to be several plants documented in this study especially for gastrointestinal and parasitological disease that might be an alternative to modern veterinary drugs. The results of this study could be a base for future ethnoveterinary and animal feed research in the region. Since there is an ongoing abandonment of highlands and traditional practices, particular attention is suggested to be given to pastoral communities in future studies. We hope that this study will stimulate further ethnoveterinary study in Turkey, Georgia and in the Caucasus in order to document this valuable cultural heritage and to promote plant-based therapies and organic animal husbandry for the well-being of livestock and humans before it is totally replaced by modern pharmaceuticals.

Declarations

List of abbreviations: UR: Use-report CI: Cultural importance RFC: Relative frequency of citation

Ethics approval and consent to participate: All interviews conformed to the International Society of Ethnobiology's Code of Ethics. Scientific Research and Ethical Committee of Artvin Çoruh University in Turkey (Issue date-no: 14/02/2018-E.2708) approved the study.

Official research and plant collection permits were obtained from the Ministry of Forest and Water

Affairs (Issue date-no: 09/02/2018-E.8919), as well as from the Scientific Research and Ethical Committee of Artvin Çoruh University in Turkey (Issue date-no: 14/02/2018-E.2708). Ilia State University in Georgia was informed, and necessary official scientific research and travel permits were obtained from the Department of Land Border Protection of the Border Police of the Ministry of Internal Affairs of Georgia.

Consent for publication: The persons showed in images gave their consent for publication.

Competing interests: The authors declare that they have no competing interests.

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Authors' contributions: C.K. (ceren.kazanci.1@iliauni.edu.ge) and S.O (soneroruc@gmail.com) designed the study, organized and conducted all the fieldwork and wrote all sections of the manuscript together. C.K. conducted the interviews, identified the plant specimens, constructed the database, analyzed the data and generated the table and map of the study area. M.M. (marine_mosulishvili@iliauni.edu.ge) partially participated in the fieldworks in Georgia, made advice and revisions during plant identifications and for the manuscript. All authors read and approved the manuscript.

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