Medicinal ethnobotany of wild woody plants: A cross-cultural comparison around Georgia-Turkey border, The Western Lesser Caucasus

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Abstract

Background The Mountains of the Western Lesser Caucasus with its rich plant diversity, multicultural and multilingual nature host diverse ethnobotanical knowledge related to medicinal plants. However, medicinal ethnobotany and the factors shaping the patterns of plant knowledge and use in the region have not yet been investigated broadly. Doing so could show the variations between communities and highlight the salient medicinal plant species. This study aimed to determine and discuss the similarities and differences of medicinal ethnobotany among people living in highland pastures on both sides of the Georgia-Turkey border. Methods During the 2017 and 2018 summer transhumance period, 119 participants, (74 in Turkey, 45 in Georgia) were interviewed with semi-structured questions. The data was structured in use-reports (URs) following the ICPC classification. Cultural Importance (CI) Index, Informant Consensus Factor (FIC), Use diversity (UD), shared/separate species-use combinations, as well as literature data were used for comparison. Results 63 native wild woody plant species were documented, nearly half of which are in common on both sides of the border, culminating in the report of 267 distinct species-use combinations. Only 7% of these use incidences are shared between both sides of the border. Around 63% of the reports had not been previously mentioned specifically in the literature. Only 11 species had similar or same use reports in both countries, namely Picea orientalis, Pinus sylvestris var. hamata, Berberis vulgaris, Sambucus nigra, Vaccinium arctostaphylos, Vaccinium myrtillus, Tilia rubra subsp. caucasica, Crataegus monogyna, Rosa canina, Rosa hirtissima and Sorbus aucaparia. 40% of species used in both countries were found to have more than one part of the plant valued for medicinal use. While in Georgia the most common way of using shrubs and trees as medicine is drinking the water infusion of fruits and leaves, drinking the water decoction of fruits and roots is seen in Turkey. 60% of the salient 20 genera in both countries have use reports in at least three medicinal use categories. In both countries, the most cited reports with high agreement are related to treatments of digestive disorders. Patterns of medicinal knowledge appear to be connected with more than one cultural factor, in particular ethnolinguistic diversity, cultural background, and access to multilingual written folk and scientific literature, or probably a combination of various factors. Conclusion Considering the regions' floral similarity, common historical-cultural contact, and similar livelihood strategies, shared ethnomedicinal knowledge across the border is quite low. Even though the impacts of accessing multilingual folk and scientific literature are likely to be significant, the factors that shape the medicinal knowledge patterns of these communities are shown to be complex and dynamic, needing further research into intracultural diversity and socio-economical conditions, as well as the political history across the border.

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Introduction

The mountains of the Western Lesser Caucasus are part of the Caucasus Hotspot, one of the 36 global biodiversity hotspots of the world [1,2,3]. This hotspot harbors around 7.000 vascular plant species, around 25% of which are endemic to the region [4]. Moreover, it is known to be a home to high linguistic, genetic and ethnic diversity [5]. Indeed, various travelers and researchers have been impressed by the diversity of language and ethnicity of the region, calling here "the mountain of tongues" [6]. Similarly, several researchers [e.g.7,8,9] highlight the significance of mountainous regions worldwide not only for biodiversity, but also for biocultural diversity, "the diversity of life in all its manifestations: biological, cultural and linguistic" [10]. Despite this, the lack of information on plant resources in ethnographic studies in particular has been identified [9], as well the lack of studies on the relationship between mountains, biodiversity and cultural diversity [7]. More effort to document and protect traditional knowledge and practices in mountainous areas has been called for, to sustain continued social-ecological health and wellbeing of humanity [9].

Recent studies conducted in Georgia (Sakartvelo) reveal a noteworthy ethnobotanical knowledge of people living in various regions [11,12,13,14,15,16,17]. Furthermore, the book "Ethnobotany of the Caucasus" presents detailed information on about culturally salient 130 plant species (48 wild woody plants) currently and historically noted in the South Caucasus (Georgia, Armenia and Azerbaijan) [18]. However, apart from a number of ethnobotanical studies published in certain parts of the western portion of the Lesser Caucasus region, little ethnobotanical knowledge has yet been systematically documented in the mountains around Turkey-Georgia border [See literature cited in Table 2]. For instance in Turkey, two general surveys conducted in some parts of Artvin province report the medicinal ethnobotany of 20 plant species (9 of them wild woody plants) [19, 20]. A recent survey conducted in a national park in Artvin also states medicinal knowledge of 37 plant species (13 wild woody plants) [21]. The neighbouring county of Ardahan is another ethnobotanically least studied area of East Anatolia [22]. Folk knowledge of 18 medicinal plant species (1 wild woody plant) were reported around the Göle and Çıldır districts of Ardahan [20], while the ethnobotanical knowledge of 65 plant species (6 of which are medicinal wild woody plants) were reported from the Çıldır district [23]. On the Georgian side, medicinal folk knowledge of at least 27 rare and endangered medicinal plants were recorded for the Samtskhe-Javakheti region [24]. Moreover, 261 plant species (of which 13 wild woody plants with medicine effects) were listed in a systematic ethnobotanical study in Samtskhe-Javakheti region [14]. A study of folk usage of medicinal plants in Adjara reported knowledge relating to 194 plant taxa (including 54 wild woody plants) [25].

Other than the above studies, very little cross-cultural ethnobotanical research has been carried out across borders within the Caucasus Ecoregion [e.g.26,27]. Recent studies conducted in Europe highlight the significance of cross-cultural and cross-border ethnobotanical research to more fully understand the factors that shape plant knowledge and uses by communities living closely under similar environmental conditions [28,29,30]. Differences in cultural backgrounds (e.g. ethnicity, language, medicinal belief systems, religion) are proposed to be significant factors affecting varying concepts of medicinal knowledge within such communities in Europe [31,32,33]. Moreover, the influence of written literature on the current medicinal plant knowledge and usage has been highlighted in detail [34,35] and the influence of USSR Pharmacopedia, especially for post-Soviet countries is discussed [29]. Similarly, the impact of "official" sources from Soviet times on traditional ethnomedicinal knowledge was investigated in

an Armenian study which identified a “new tradition”, which they suggest has indirectly promoted the enrichment and preservation of phytomedicinal knowledge and traditions [36].

Given the above situation, the objectives of this study are:

- To document the medicinal folk knowledge about wild woody plants and highlight shared and divergent knowledge of use between transhumant communities in Georgia and Turkey, as well as comparing the knowledge with the ethnomedicinal literature sources.
- To evaluate the cultural significance of the most salient plant families, genera, species and their medicinal uses among participants in Georgia and in Turkey. Furthermore, the underlying factors of use/knowledge patterns for these plant species will be discussed.

Materials And Methods

Area of Study

The geographical area covered in this study is located along the border between Georgia and Turkey, in the Western Lesser Caucasus (Fig. 1.). This corresponds to part of the highlands between the Hopa-Artvin-Ardahan-Çıldır main road (41°23’38”N, 41°25’08”E - 41°01’33”N, 43°28’14”E) in Turkey and Batumi-Khulo-Akhaltsikhe-Ninotsminda main road (41°36’03”N, 41°34’30”E - 41°08’ 30”N, 43°47’24”E) in Georgia. It falls within the borders of Adjara and Samtskhe-Javakheti regions in Georgia; Artvin and Ardahan provinces in Turkey. The area includes the characteristics of three of the world’s ecological regions: The Caucasus Mixed Forest Ecoregion, Euxine Colchic Deciduous Forest Ecoregion and to a lesser extent Eastern Anatolian Montane Steppe Ecoregion [37]. 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 Samsthke-Javakheti border [38]. Two comprehensive studies of dendroflora (including exotic and invasive woody plants) reported 171 woody plant taxa in Artvin [39] and 185 woody plant taxa in Adjara [40]. Most of these species are found on both sides of the Georgia-Turkey border.

Between 1300 BCE and 580 ADE the area fell within the kingdoms of Colchis, Diauehi, and Iberia. The region witnessed various wars, migrations and deportations and several kingdoms, empires, principalities, and countries succeeded until the current day. The variety of ethnolinguistic groups inhabiting the area include Turks, Georgians, Armenians, Kurds, Azeris, Laz people, Hemshins, and Russians, with small-scale agriculture and relatively large-scale livestock farming as the 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 “ialagi” (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, some living in dry stone dwellings or even in tents.

Ethnobotanical data collection

To restrict the focus of the study on the ethnobotanical knowledge of transhumant people, more than two-thirds of the fieldwork was conducted in highland pastures along the Georgian-Turkish border. Firstly, over 150 potential highland pastures were identified between altitudes of 1600m and 2500m within the study area, using Google Earth. Later, possible research locations were selected from among those settlements according to a number of geographical barriers (mountains, rivers, lakes, passes) that would help identify high diversity of floral and cultural characters. By attempting to reach people who had maintained their agro-pastoral transhumance lifestyle, it was expected that these people would have been in contact with a variety of vegetation types during regular seasonal migrations, thus having a relatively strong living memory of traditional knowledge and practices related to wild plants.

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 [41]. 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 female; 33 male), and 45 in Georgia (28 female; 17 male). The mean ages of participants were 57 and 58 respectively in Georgia and in Turkey.

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 obtained from the Department of Land Border Protection of the Border Police of the Ministry of Internal Affairs of Georgia.

Initial investigation considered the flora in different vegetation zones (forest, meadow, wetlands, steppe, rocky areas) en route to and in the vicinity of each selected highland pasture. This process took around 2-3 hours for each highland pasture. This reconnaissance involved the identification of woody and herbaceous plants, where possible to species level, in which photographs and a minimum of three samples were collected for each. This had a dual purpose, firstly to be able to show participants for them to identify plants they would talk about, and secondly to prepare herbarium voucher specimens for later detailed identification.

The research team was composed of three or four people. The first (female) and second (male) authors were always involved in the interviews, with a translator - either male or female. Throughout the study, the first author was always the principal interviewer. In Turkey, the interviews were conducted directly in the Turkish language, while in Georgia, interviews were in Georgian, Russian, or Turkish. The majority of the interviews in Georgia were performed with the help of translators who spoke Georgian, Russian, and English, either as a mother tongue or as a second language. Interviews were later translated into English. Two weeks before the fieldwork, the translators were provided with information and terminology relevant to the research. Information relating to the purpose of the study was given to all participants and their free, prior informed consent - for interviewing, recording, photographing, and/or publishing their knowledge - obtained orally from each at the beginning of their interviews. All interviews conformed to the International Society of Ethnobiology's Code of Ethics [42]. The obligations of the Nagoya Protocol also being considered, it was approved that "the right of use and ownership of any traditional knowledge of all informants remains with them, and that any use of the information except for scientific publication, requires the additional consent of the traditional owners, and consensus on access to benefits derived possibly later use" [43].

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 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. The first author took notes directly in a notebook during all interviews. Depending on participants' wishes, audio or video recordings were made of the interviews. Information about plants collected from the wild was documented, specifically with data regarding 1) their folk names in different languages and dialects with different phonological and lexical variations, 2) collection time and place, 3) parts used for medicinal purposes, 4) processes of preparation and administration, and 5) source of the plant knowledge. In addition, observations were made and photos 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 proximity(~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.

Taxonomic Identification of plants

Preliminary identification of plant species was carried out in the field by the authors. The plants were photographed with their coordinates and then voucher herbarium specimens were prepared by the first author for further identification. Relevant flora resources were used for identification [44,45,46,47,48,49]. Identified specimens from Georgia were checked by the third author, and stored in the National Herbarium of Georgia. Specimens identified in Turkey were checked by Prof. Özgür Eminağaoğlu and stored in the Herbarium of Artvin Çoruh University. Species were named based on current accepted names [50]. Furthermore, plant synonyms were given after consulting "Plant List of Turkey - Vascular Plants" [51] and "Vascular Plants of Georgia - A nomenclatural checklist" [52].

Data analysis

Firstly, all reported plant species and their relevant ethnobotanical data were entered into a Microsoft® Excel spreadsheet in a use-report (UR) based order [53,54,55], following the categories in the Economic Botany Data Collection Standard [56]. Under each use-category, each different use was counted as one UR [57]. For example, if a participant mentioned a species used for headache and coughing, it counted as 2 UR. Secondly, the data of woody plants and their related

medicinal use reports were extracted. After a final classification of the categories, pivot tables were constructed for further analysis. The final classification of reported ailments and diseases considered The International Classification of Primary Care (ICPC-2-R) developed by World Organization of Family Doctors [58] and accepted by the World Health Organization (WHO), on suggestions by several authors of comparative ethnomedicinal studies [59,60]. 12 medicinal use-categories for several emic/folk subcategories were determined (See in Table 1). To reduce error and better confirm the local perceptions of participants, minor modifications were made to the ICPC categories.

Table 1 Assigned medicinal use categories for reported ailments.

	Ailments/ Illnesses
Medicinal use categories	
Digestive	constipation, diarrhea, dysentery, gallbladder, gastrointestinal infection, indigestion, liver disease, stomach ache, tooth bleaching, tooth inflammation, toothache, worm, clean intestine, gall disease, intestinal disease, jaundice, ulcer
Respiratory	asthma, bronchitis, cold, cough, influenza, lung disease, throat ache, throat inflammation, tonsil, shortness of breath
Cardiovascular	vasodilator, hemorrhoids, heart disease, high blood pressure, varicose vein
Skin	antiseptic, blister, boil, bruises, burn, eczema, hair loss, irritation, wart, cuts, wound, antifungal, itching, belief (wart), psoriasis, rash, snake bite
Endocrine	diabetes, gout, thyroid
General health and unspecified	allergy, cleaning organs, fever, general disease, good for health, measles, tiredness and weakness, tuberculosis, vitamin deficiency
Genitourinary	high menstrual bleeding, incontinence urine, kidney disease, kidney pain, kidney stone, prostate, urinary disease, vaginal discharge, women disease (infertility), abortion, diuretic
Muscle-skeletal	back pain, bone and joint pain, rheumatism, sprain, knee ache, fracture
Eye	eye diseases, good for eyes
Blood	anemia, cleansing blood, hematinic, iron deficiency
Neurological	headache, dizziness
Psychological	relaxing

This paper considers ethnomedicinal data limited to wild woody plants, including shrubs, trees and woody climbers encountered during the 2017 and 2018 fieldwork for the current data analysis. Ethnobotanical interviews and data analysis focused on “wild” (non-cultivated) plants native to the study area. For instance, species such as *Malus domestica*, *Prunus x domestica*, *Morus alba*, *Robinia pseudoacacia* etc. were excluded from the study since they are either widely cultured or exotic. Although they are also cultivated, *Corylus avellena*, *Juglans regia, Ribes rubrum* etc. were included as they are native to the area or have run wild and become naturalized. There was no focus on or promotion of exotic plant species or unconventional (introduced) knowledge related to them. This choice was made not only for logistical reasons, but also because even though exotic plants may somewhat enrich local ethnobotanical knowledge [61], there are also documented adverse effects on local biodiversity, ecosystem services and local community livelihoods as well as cultural diversity [62,61,63]. Furthermore, participant knowledge and perceptions of plant collecting places were used to decide which species qualified as “wild”. Based upon these criteria, a total of 63 wild woody plant species were included in the analysis.

Firstly, the number of species mentioned on both sides of the Georgia-Turkey border were compared using Venn diagrams. This illustrates the level of species richness and shared species for the evaluation of regional ethnomedicinal knowledge.

Secondly, common and distinct ethnomedicinal knowledge and use were compared among communities researched on both sites of the border as well as with relevant ethnobotanical literature in the Caucasus Ecoregion. A species-use combinations approach involved both medicinal sub-categories (reported ailments/illnesses) and medicinal categories (e.g. digestive, respiratory etc.). This presents the level of shared use/knowledge incidence and its variations among communities studied, as well as within the wider Caucasus Ecoregion. The shared knowledge is given in bold, with knowledge unique to Turkey italicized

and that unique to Georgia not italicized. A single plus (+) indicates similar usage and double plus (++) identical usage with the literature sources (See in Table 3).

Thirdly, the medicinally valuable woody plants were quantified and compared in function of most salient plant families, genera, species as well as their plant parts, medicinal use and preparation methods across the border. The following indices were used to evaluate the relative cultural significance, versatility of species and consensus on medicinal use and knowledge on the both sides of the border.

a. The Cultural Importance index (CI): A widely used index in ethnobotanical studies [g 64, 33], it is known to produce reliable results in assessing the relative cultural significance of each plant species while comparing different regions with different participant numbers [65]. This is known to be effective not only in presenting the spread of use (number of participants) but also to highlight the diversity of uses (versatility) for certain plant species in cross-cultural ethnobotanical studies [65].

CI values are calculated by adding the number of use reports (UR) of all the participants in every use-category mentioned for a species, divided by the number of participants in the survey [64].

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

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

UR: Use report.

In the case of this study, although the CI values of each species (CI_s) were calculated separately (See in Table 3) instead of comparing only CI_s, attention was paid to the Cultural Importance of each plant genus (CI_g: total value of CI_s in the same genus) to reveal the more versatile genera. Besides, the Cultural Importance of each family (CI_f) was computed by adding CI_g values for all genera of a same family [64,66]. These approaches will reduce the risks of under or over estimation of the CI for certain plant species due to misidentification of very similar species and subspecies; this would also compensate for possible effects of different folk taxonomic classifications among participants. It is known that closely related plant species share common natural products [67], whose type of usage may also clump phylogenetically [68].

Therefore, we believed that a CI_g-based comparison would also serve as a sufficient indicator to illustrate key points of the study. The CI Index was also applied to medicinal use categories to estimate the contribution of each use category to CI_g [69,70]. This time, the number of URs for each use-categories was divided by the number of participants in the survey.

b. Informant Consensus Factor (FIC): Another commonly used index for exploring potentially active medicinal plants for certain ailments, FIC was first proposed and used in medicinal ethnobotany studies to estimate the agreement of participants on a number of plant species according to specific use-categories (illnesses or ailments) [71].

FIC values are obtained as follows: number of use-reports in each use category (n_{ur}) minus the number of taxa used (n_t), divided by the number of use-reports in each category minus one [71,72].

$$\mathrm{Fic} = (\mathrm{nur} - nt)/(nur - 1)$$

n_{ur}: number of use-reports in each use category; n_t: number of taxa used for that use category

Where, FIC ranges from 0 to 1.

In this study, by using FIC index, the level of agreement of our participants on the ethnomedicinal knowledge of woody plants species were evaluated.

FIC values close to 1 reflect a high consensus on a certain plant species for a given illness or ailment (use-categories). On the other hand, FIC closer to 0 (zero) would indicate either a high degree of intracultural variation or a significant lack of documentation of the participants' knowledge [57].

c. Use Diversity Value (UD_s) : It measures how many use categories a species is used and how evenly this contribute to its total use. It is calculated as follows [73].

$$UDs = 1/\sum P_c^2$$

Where P_c^2 contribution of use category c to the total utility of a species s, calculated as the number of times species s was mentioned within each use category, divided by the total number of reports of use of species s across all use categories. UDs values range between 0 and number of use categories for which it is used.

Results And Discussion

Overall results, comparisons and extrapolations

Table 3 below summarizes the information about use-reports of the 63 native wild woody plant species known/used for medical purposes by participants in the study area. Taking into account the fact that the native wild dendroflora of the study area has around 150 species [39,40], reported wild woody plant species for medicinal use in this entire study account for 42% of this native dendroflora. The regions on either side of the border share approximately half of the reported plant species. Considering the fact that almost the same flora is found in the two regions, the level of similarity is quite low. In addition, the number of unique species (23 species) mentioned only by participants in Georgia is significantly higher than the number of unique species (6 species) mentioned only in Turkey (Fig. 2.).

In the comparison of the 267 distinct species-use combinations based on medicinal (folk/emic) sub-categories (e.g. asthma, ulcer, wound healing etc.), participants in both countries shared identical or similar medicinal knowledge of only 19 use incidences (7% of total species-use combinations) for 11 wild woody plant species (17% of reported species) in common (Fig. 3a). Examples include mentions by participants in both countries of *Sambucus nigra* for stomachache, or that of *Berberis vulgaris* for jaundice. Other species having identical/similar purposes of use reported in both countries are *Picea orientalis*, *Pinus sylvestris var. hamata*, *Vaccinium arctostaphylos*, *Vaccinium myrtillus*, *Tilia rubra subsp. caucasica*, *Crataegus monogyna*, *Rosa canina*, *Rosa hirtissima and Sorbus aucaparia*. In contrast, 158 distinct uses (illnesses/ailments) were reported only from Georgia, whereas only 90 unique uses were reported from Turkey (Fig. 3a).

When comparisons were based on medicinal use categories (e.g. digestive, respiratory, cardiovascular system etc.), out of 178 species-use combinations, only 32 (18% of reported species) of these were found to be in common in both countries (Fig. 3b). The results in figures 3a and 3b indicate significantly low consensus of medicinal knowledge about shared native wild dendroflora across the border. This lack of shared ethnomedicinal knowledge might be a sign of different epidemiology of certain ailments in communities studied as well as different medicinal knowledge systems on both sites of the border. In other words, participants in both countries use a significant number of similar species for different purposes. Similarly, when the ethnobotanical data of literature from the Caucasus were combined with this study's data for the comparison of the species-use combinations, the shared ethnomedicinal knowledge of wild woody plants across the border almost doubled compared to the analysis based only on this study's data. However, the similarities were still relatively low (ranging between 20% and 34%) considering the fact that there are almost the same floral conditions across the border (Fig. 3c. 3d.).

Table 3 reflects similarities and differences seen between information reported in this study and reports from 26 main literature sources related to folk knowledge of medicinal plants from the Caucasus Ecoregion, mainly North-Eastern and Eastern Black Sea Region of Turkey and Georgia, as well as Armenia and Azerbaijan, including literature from Soviet period. As far as can be ascertained, medicinal folk knowledge relating to 16 wild woody plant species from this study was not mentioned specifically in any of the above mentioned literature sources, namely *Cotinus coggygria*, *Ostrya carpinifolia*, *Lonicera xylosteum*, *Quercus macranthera*, *Ribes alpinum*, *Ribes nigrum*, *Ribes rubrum*, *Ribes uva-crispa*, *Crataegus azarolus var. pontica*, *Crataegus pseudoheterophylla*, *Crataegus rhipidophylla*, *Prunus avium*, *Rosa hirtissima*, *Rosa mollis*, *Rosa villosa* and *Rubus caucasicus.* Moreover, of this study's 267 distinct species-use combinations based on medicinal sub-categories (asthma, ulcer, wound healing etc.), only 98 of them are similar or identical with those in the above mentioned literature reports. This means that around 63% of this study's use reports (as a species-medicinal subcategory combination) have not been mentioned specifically in these items of literature. In particular, 57% of the species-use combinations reported in Turkey and 56% of those from Georgia are original, in that they have not been previously reported in the literature. On the other hand, when similarities between this research data and 26 related literature sources are evaluated, this study has 5 to 16 species and 7 to 50 similar/identical use reports in common with only half of the available literature from the Caucasus Ecoregion (Table 2). Although the references were arranged according to their proximity to this specific study area, with the first reference (1) being closest and the last (26) being either furthest or general research, no significant relationship between similarity of the recorded species or uses and the geographic

proximity to this particular study area was found. Indeed, as seen in Table 2, of the five pieces of research conducted within this study area, only one research (Ref.no:2) showed significant enough relationship between recorded species in this study. Since the areas of these ethnobotany research studies have nearly identical flora, it is the differences in research methodologies, content/focus and amount of effort spent on each task which most probably have impacted the number of wild woody species and use reports.

Nevertheless, although very limited, the fact that a number of plant species and similar/identical medicinal reports are in common with various close and far areas of the Caucasus Ecoregion would be indicative of consensus and high cultural value for the medicinal knowledge of certain wild woody plant species in the Ecoregion. The most important fifteen wild woody plant species consistent with both this study's reports and those in literature sources are: *Picea orientalis*, *Pinus sylvestris var. hamata*, *Rosa canina*, *Rosa spinosissima*, *Berberis vulgaris*, *Vaccinium myrtillus*, *Vaccinium arctostaphylos*, *Tilia rubra*, *Juglans regia*, *Sorbus aucaparia*, *Alnus glutinosa*, *Viburnum lantana*, *Viburnum opulus*, *Crataegus pentagyna and Mespilus germanica*.

Table 2 Compared literature sources from the Caucasus Ecoregion having more than four shared species with this study.

Ref. no[a]	Reference type	Study area(s)	Country	#same species	#Similar and identical report[b]
(26)	Review book	Caucasus	Georgia, Arm., Azr.	16	50
(24)	Article	Svaneti and Lechkhumi	Georgia	11	12
(25)	Article	Tusheti, Khevsureti, and Pshavi	Georgia	10	14
(11)	Master's thesis	Rize (Güneysu)	Turkey	8	13
(22)	Master's thesis	Giresun (Dereli)	Turkey	6	8
(21)	Article	Giresun (Espiye)	Turkey	6	8
(8)	Article	Erzurum (Oltu)	Turkey	6	11
(6)	Article	Kars (general)	Turkey	6	7
(7)	Article	Erzurum (Ilıca)	Turkey	6	7
(13)	Article	Artvin, Bayburt, Gümüşhane	Turkey	5	7
(16)	PhD Thesis	Iğdır (general)	Turkey	5	7
(12)	Article	Rize and Trabzon	Turkey	5	8
(2)	Article	Adjara (general)	Georgia	5	7

[a] See the cited references below Table 3.

[b] Each shared knowledge related to emic medicinal reports (e.g. burn, cold, anemia...) was counted as one similar/identical report. See medicinal sub-categories in Table 3.

Table 3 Medicinal ethnobotany of reported wild woody plants in the study area. (GEO: Georgia; TUR: Turkey; n: number of participants; UR: Use report; CI_s: Cultural Importance Index of species)

Latin names of families and species (voucher or digital photograph number)[a]	Recorded local names[b]	Recorded plant part/s and processing techniques[c]	Medi-cinal use cate-gories[d]	Recorded medicinal sub-category and applications[e]	GEO n=45 UR	GEO n=45 CI_s	TUR n=74 UR	TUR n=74 CI_s	Similar(+) or Identical (++) use in the literature[f]	Different use in the literature[g]
CUPRESSACEAE										
Juniperus communis L. syn: *Juniperus hemisphaerica* C.Presl **(CK, SO 178*, 511)** (CK, SO 382, 439*, 614*, 1026, 1063, 1670)	*ardıç, arduç, yer ardıcı, yabani incir, çırçır, lışık, ankri, akri, gıviya;* ghvia (□□□□), gviya,	1 fruits, infusion in water 2 fruits, sweet dish (pekhmez) 3 fruits, decoction in water	respir	asthma *INT- D 1*	0	0,00	1	0,04	NO	(3) respiratory tract diseases. (24) blood cleansing, kidneys, urinary system, ulcer. (26)(Geo) anti-inflammatory and diuretic for genitourinary diseases, urinary retention problems, rheumatism, skin diseases, dermatitis, painkiller, inflammation of kidneys and bladder
			digest	ulcer *INT- E 2*	0		1		NO	
			cardio	haemorrhoids *INT- D 3*	0		1		+(7)	
PINACEAE										
Abies nordmanniana (Steven) Spach **(FP-SO 1)** (CK, SO 364*, 405*, 424*, 466*, 606*)	*göknar, köknar, küknar, soç ladini, soç, soçi, doruk;* soch, sochi (□□□□), yalka, (yolka, □□□□), kotiya	1 entire plant, breath in the forest of this tree 2 resin, infusion in water 3 young seed cones, infusion in water 4 resin, macerated	respir	bronchitis INT- RT 1	3	0,11	0	0,00	NO	(13) to mature abscess. (26)(Geo) eczema, stop bleeding in wound.
				cough INT- D 2					NO	
				lung disease INT- D 3					NO	
			GHUS	tuberculosis INT- RT 1	1		0		+(24)	
			skin	wound EXT- P 4	1		0		++(13)	
Picea orientalis (L.) Peterm. **(CK, SO 26*, 110, 446)** (CK, SO 404*, 462*, 658, 1041, 1676)	*ladin, köknar, küknar, göknar, nadzvi, çam, çam ağacı, karaçam;* nadzvi (□□□□□), yel, yolka (□□□□), yeghevni (□□□□□)	1 resin (pisi, khevi, çsisip), fresh 2 resin (khevi), infusion in water and mixed with honey 3 entire plant, breath in the forest of this tree 4 resin, decoction in water 5 resin, macerated 6 young seed cones, infusion in water 7 resin, infusion in water 8 pollen cones, infusion in water 9 resin, decoction in milk 10 resin, macerated and mixed with melted beewax, butter and	digest	stomach ache **INT- C 1,** *E 1*	8	0,60	21	0,58	++(22)	(3) respiratory tract diseases. (11) cuts, inflammations. (19) pneumonia, lung abscess, eczema, intestinal parasite. (20) skin diseases, astringent, intestinal disorders, diabetes.
									NO	
				ulcer *INT- C 1, E 1*					+(19), +(20), ++(22), +(24),	
				toothache INT- C 1					NO	
				tooth bleaching **EXT- G 4**					NO	
			GHUS	tuberculosis INT- RT 3	1		0		+(19), +(24),	
			genito	vaginal discharge *INT- E 1*	0		1		NO	
			mu-sk	fracture *EXT- P 5*	1		3		NO	
				sprain EXT- P 5					NO	
			respir	tonsil INT- D 6	9		1		NO	
				asthma INT- RT 3					NO	
				lung disease **INT- D** 2, 6, 9, 11, *7,* C 1					+(19)	
				bronchitis INT- D 8					+(1)	
				cough INT- D 7					NO	
			skin	wound **EXT- P 5,** *S 10*	8		17		+(1), ++(10), +(11), +(20), +(22)	
				bruises *EXT- P 5*					NO	
				burn *EXT- P 5*					+(11), +(19)	
				antiseptic *EXT- P 5*					NO	
				boil **EXT- P 5**					NO	

Latin names of families and species (voucher or digital photograph number)[a]	Recorded local names[b]	Recorded plant part/s and processing techniques[c]	Medi-cinal use cate-gories[d]	Recorded medicinal sub-category and applications[e]	GEO n=45 UR	GEO n=45 CI_s	TUR n=74 UR	TUR n=74 CI_s	Similar(+) or Identical (++) use in the literature[f]	Different use in the literature[g]
		olive oil 11 young seed and pollen cones, infusion in water		antibacterial EXT- P 5					NO	
Pinus sylvestris var. *hamata* Steven syn: *Pinus sosnowskyi* Nakai (CK, SO 77, 447) (CK, SO 543*, 1175)	*sarı çam,* *çam,* *çam kakası,* *çam sakızı,* *dağ sarı çamı,* *toruk, ifti,* *küknar,* *pitçvi, pitckghi,* *katari,* *çivçi,* *kalem ağacı;* pich'vi (□□□□□), katris pichvi, sosna (□□□□□□), katari (□□□□□□, k'at'ari), katri, tonazar, gadik	1 pollen cones, infusion in water 2 young seed cones, infusion in water 3 heartwood, put near pillow 4 resin, fresh 5 young seed cones, decoction in water 6 pollen cones, mixed with honey 7 young seed cones, sweet dish (jam) 8 young seed and pollen cones, sweet dish (compote, jam) 9 young seed and pollen cones, decoction in water 10 young seed and pollen cones, infusion in water 11 young seed and pollen cones, mixed with honey 12 pollen cones, macerated 13 resin (pisi), macerated	cardio	high blood pressure INT- D 1, 2; EXT- RT 3	3	0,67	0	0,12	NO	(3) respiratory tract diseases. (6) gastritis. (8) back pain, to mature inflammation, anti-inflammatory, soften skin, fuse bones. (11) cuts, inflammations. (13) snake bite. (18) eczema, analgesic. (19) pneumonia, lung abscess. (24) ulcers. (25) allergies, sinusitis, fungal diseases (26)(Geo) stop bleeding, eczema, scabs, urinary problems. (26)(Arm) expectorant, diaphoretic, vitamin supplement. (26) (Azr) podagra (gout).
			digest	stomach ache **INT- C 4**, *E 4*	3		3		+(12)	
				toothache EXT- G 5					++(6)	
			endoc	diabetes *INT- D 2*	0		2		NO	
			GHUS	tuberculosis INT- E 6	2		0		+(24), +(25)	
			genito	diuretic *INT- D 5*	1		1		+(25), +(26)(Arm)	
				urinary disease INT- E 7					+(1)	
			mu-sk	rheumatism EXT- B 5	1		0		+(12), +(26)(Azr),	
			respir	lung disease INT- D 1, 10, E 7, 8, 6, 11, V 9	18		2		+(19), +(25),	
				cough INT- D 1, 2					+(1), +(6), +(26) (Azr)	
				asthma **INT- D** 1, *2*, E 7					+(1)	
				bronchitis **INT- D** 1, 10, *2*, E 6, 11, 8					+(1), +(12), +(19), +(25)	
			skin	wound *EXT- P 12*	2		1		+(6), +(8), +(11), +(18), +(19), +(26)(Azr),	
				antibacterial EXT- P 13					+(13)	

Latin names of families and species (voucher or digital photograph number)[a]	Recorded local names[b]	Recorded plant part/s and processing techniques[c]	Medi-cinal use cate-gories[d]	Recorded medicinal sub-category and applications[e]	GEO n=45 UR	GEO n=45 CI_s	TUR n=74 UR	TUR n=74 CI_s	Similar(+) or Identical (++) use in the literature[f]	Different use in the literature[g]
				burn EXT- P 13					+(11), +(19), +(25), +(26)(Arm)	
TAXACEAE										
Taxus baccata L.	utkovari (□□□□□□□□,utkhovari), madah, chancholo	1 fruits, fresh	GHUS	general disease INT- E 1	1	0,02	0	0,00	NO	(26)(Geo) diseases of cardiovascular system, (26)(Azr) heart disease, gastric remediy, antirheumatic
ADOXACEAE										
Sambucus nigra L. **(CK, SO 237*, 277*)** (CK, SO 798)	*düldül ağacı, antzli, denderejik, didgel ağacı, çoban çırası;* didgula (□□□□□□), didguli, dudguli, dudgula balakhi, antzli, cheveneburi antzli	1 fruits, 1kg fruit decocted in sugar, every morning drink on an empty stomach 2 aerial parts with fruits, decoction in water 3 flowers, infusion in water 4 fruits, infusion in sugar (1:1), insolation, one table spoon	digest	stomach ache INT- D 1; *EXT- B 2*	5	0,11	1	0,03	NO	(3) respiratory tract diseases. (10) haemorrhoids. (13) to mature abscess. (26)(Geo) emic, rabies, fever, cold, rheumatism, varicose veins, ear inflammations. vasodilatory, anti-atherosclerotic, cholagogic, expectorant, diuretic. (26)(Arm) diaphoretic, genitourinary diseases. (26)(Azr) sudorific, cold, cough, anti-inflammatory, burns, furuncles, haemorrhoids, diuretic, rheumatism.
				constipation INT- D 1					+(26) (Geo, Azr)	
				diarrhoea INT- D 4					+(26) (Geo)	
				dysentery INT- D 4					NO	
				gastrointestinal infection INT- D 3					NO	
			genito	women disease (infertility) *EXT- B 2*	0		1		NO	
Viburnum lantana L. **(CK, SO 9*, 455)** (CK, SO 512*, 595*, 1498, 1664, 1673, 1704)	*germeşe, gürmüşe, germoşa, gemriş, germişe, garmoşa, germoşe, germeşek, karmaşoy, garmaşoy, germişağ, ayı kakası, germeşe, germoşe, germeşek, karankaç, garmonata, germişek, germuşe, garmoşe, uzan, çoçki, karakura,*	1 fruits, fresh 2 branches, decoction in water, infused for one night 3 seeds, fresh 4 fruits, infusion in water, mixed with *Mentha* sp.	cardio	haemorrhoids INT- E 1	2	0,07	0	0,01	++(7), ++(17)	
				heart disease INT- D 4					NO	(5) warts. (16) diarrhea. (24) cold, hypertension, inflammation. (25) hypertension. (26)(Geo) spasmolytic, sedative, antihemorrhagic. (26)(Azr) astringent, septic wounds, angina.
			digest	diarrhoea INT- D 2	1		1		+(16), +(26)(Azr)	

Latin names of families and species (voucher or digital photograph number)[a]	Recorded local names[b]	Recorded plant part/s and processing techniques[c]	Medi-cinal use cate-gories[d]	Recorded medicinal sub-category and applications[e]	GEO n=45 UR	GEO n=45 CI_s	TUR n=74 UR	TUR n=74 CI_s	Similar(+) or Identical (++) use in the literature[f]	Different use in the literature[g]
	tantar ağacı, dendereşik, gırmiço; uzani (□□□□□), uzni (□□□□), urzni, uzni cokhi, uznis chikiri, germuşe, motskhvari, germeşe, germençe, garnavaşi, chapran			constipation *INT- E 3*					NO	
Viburnum opulus L. (CK, SO 449, 488) (CK, SO 40, 1456, 1629, 1665)	*uzni çkiri, tsotsgi, toskgvi, tirapol, cahoyle, cahole, çiaghole, cavhele, zakule, süpürge ağacı, süpürgelik ağacı;* dzakhveli (□□□□□□□), jahola, jarkhvela (□□□□□□□, jakhvela)	1 fruits, fresh	cardio	high blood pressure INT- E 1	1	0,02	0	0,03	+(3), +(15), +(24), +(25),	(1) cough, heart. (3) against breast cancer, vitamins. (11) blood cleansing, kidney stones. (15) cough. (25) cough, lungs.
			genito	kidney disease *INT- E 1*	0		1		+(11)	
			endoc	diabetes *INT- E 1*	0		1		NO	
ANACARDIACEAE										
Cotinus coggygria Scop. (CK, SO 2)	*tirimli*; trimli (□□□□□□)	1 branches, decoction in water	GHUS	measles EXT- B 1; INT- D 1	1	0,02	0	0,01	NO	
		2 leaves, dried and powdered	skin	rash *EXT- EM 2*	0		1		NO	
ARALIACEAE										
Hedera colchica (K.Koch) K.Koch (CK, SO 84) (FP-SO 12)	*suro, sici, siyoğ, siyoğh, sarmchık, lobio otu;* suro (□□□□)	1 flowers, infusion in water	genito	vaginal discharge INT- D 1	1	0,02	0	0,00	NO	(15) burns, migraine.
BERBERIDACEAE										
Berberis vulgaris L. (CK, SO 27*, 52*, 458, 500) (CK, SO 56, 1651, 1693)	*bınav, karmuk, çekehur, çıkahor, jevjel, sakvitlo, karasor-ghun, çivir, sarılık otu, kasahor, koçahur, kotçahura;* kotchahuri (□□□□□□□□, k'ots'akhuri) kotshakhur, shauna, barbarisi, (□□□□□□□□, barbaris)	1 leaves, infusion in water	digest	jaundice **EXT- B 2**, 6, 3, 4; **INT- D** 6, 3, *2, 5*	8	0,22	14	0,20	++(7), +(8), ++(9), +(13), +/++(26) (Geo, Azr),	(3) cholagogue. (9) haemorrhoids, scabies, eczema, distress, sadness, weakness. (11) urinary tract infections. (16) cold. (17) cold, diabetes. (25) gallbladder. (26)(Geo) enhances appetite and sexual potency, stop bleeding, gallbladder problems (cholelithiasis and cholecystitis), nephrolithiasis, rheumatism, gingivitis, vitamin C, scurvy, stomach disorder. (26)(Arm) vitamin, eye, teeth, ulcer, kidney, ureter diseases, styptic and sudorific. (26) (Azr) heart pain, sedative for fast heat beats, rheumatismal pain, malaria, fever, hypoxemia of stomach, antidiarrhoeal, diabetes, angina, cough, eye diseases, anastaltic.
		2 branches, decoction in water		liver disease INT- D 1, 3					+(25), +/++(26) (Geo, Azr, Arm)	
		3 roots, decoction in water	cardio	hemorrhoids *EXT- B 2*	1		1		+(8), +(9)	
		4 fruits, decoction in water		high blood pressure INT- D 1					+(24), +(26) (Geo)	
		5 branches with leaves, decoction in water	respir	throat ache INT- D 4	1		0		NO	
		6 branches, decoction in three liter of water, mixed with one branch of *Helichrysum* sp. (nego)								

Latin names of families and species (voucher or digital photograph number)[a]	Recorded local names[b]	Recorded plant part/s and processing techniques[c]	Medi-cinal use cate-gories[d]	Recorded medicinal sub-category and applications[e]	GEO n=45		TUR n=74		Similar(+) or Identical (++) use in the literature[f]	Different use in the literature[g]
						UR		UR		
BETULACEAE										
Alnus glutinosa subsp. *barbata* (C.A.Mey.) Yalt. syn: *Alnus barbata* C.A.Mey. (CK, SO 238*, 256*, 106) (CK, SO 328*, 16, 862, 1051)	*kızılağaç,* *çançisi,* *çançi,* *bedzghi,* *morkan,* *txomu,* *tıkmela,* *tıkemali, tskremla;* tkhmela (□□□□□□, tkhmela), tkhemla (□□□□□□, tkhemla), murkani (□□□□□□□, murk'ani)	1 fruits, infusion in water 2 leaves, infusion in water 3 pollen cones, infusion in water 4 leaf buds, macerated 5 leaves, fresh, how many wart you have hang in house that much leaves	genito	prostate INT- D 1	1	0,07	0	0,04	NO	(4) to mature abscess. (10) cleaning wound, stomachache, haemorrhoids. (11) wound healing. (15) wounds. (20) skin diseases, skin rubbing. (21) haemorrhoids, stomach disorders. (22) rheumatism.
			skin	bruises EXT- B 2	1		2		+(3), +(8), +(10),	
				cuts *EXT- P 4*						
				wart *EXT- RT 5*					NO	
			respir	lung disease INT- D 3	1		0		NO	
			mu-sk	knee ache *EXT- P 4*	0		1		NO	
Betula pendula Roth. (CK, SO 440) (CK, SO 22, 1536, 1590, 1643, 1659, 1695)	*kayın,* *kayın ağacı,* *arki, arkvi,* *düsik,* *arci, arghi,* *çalgı,* *düsk ağacı,* *ahır süpürgesi,* *tuzık;* arki (□□□□, ark'i), arkhi, beryoza (□□□□□□, bereza), beryozka, gechi, (□□□□, kech'i), gechin	1 inner barks, decoction in water 2 leaves, infusion in water 3 inner barks, cut in pieces and roasted in butter	digest	tooth bleaching EXT- G 1	3	0,09	1	0,03	NO	(18) wounds, rheumatism. (25) big heart.
				gastrointestinal infection INT- D 1					NO	
				stomach ache *INT- C 3*					NO	
				liver disease INT- D 2					NO	
			genito	urinary disease INT- D 2	1		0		NO	
			respir	throat ache *INT- C 3*	0		1		NO	
Corylus avellana L. (CK, SO 11*, 248*, 442, 480) (CK, SO 778, 784, 810, 1627)	*yabani fındık,* *fındık,* *finduk,* *çubuk,* *ğağin,* *thkili,* *tığhili,* *tikhili,* *tıkili,* *tikili;* tkhili (□□□□□), orekh, (□□□□), arehğ, ğağin, fındık, funduk (□□□□□□), fınduki, finduk	1 leaves, infusion in water 2 leaves, juice 3 leaves, fresh	skin	bruises EXT- B 1	1	0,07	2	0,03	NO	(3) increase immunity, antibechic. (10) cough. (12) anemia. (13) female infertility. (20) constipation. (21) cough, high cholesterol. (25) cough, gangrene. (26) (Geo) antidiarrheal, antimicrobial, anti-inflammatory,weakness, lung disorders, gallstones, anemia, rheumatism,haemorrhoids, rectum diseases. (26) (Arm) liver, gallbladder, reduce cholesterol, varicose veins, vitamin. (26)(Azr) intestinal disease, diarrhea, urolithiasis, malaria, fever, general weakness, low libido, dizziness, haemorrhoids.
				cuts *EXT- P 3*					NO	
				snake bite *INT- D 2*					NO	
			endoc	diabetes EXT - B 1	1		0		NO	
			GHUS	allergy EXT- B 1	1		0		NO	
Ostrya carpinifolia Scop.	*ıstıriç,* *utsetelay,* *ukrey ağacı*	1 flowers, infusion in water	neuro	headache INT- D 1	1	0,02	0	0,00	NO	

Latin names of families (FP-SO 6) and species (voucher or digital photograph number)[a] (CK, SO 78, 784, 810, 1627)	Recorded local names[b] *ohrav, ihon,* ukhrava (□□□□□□), ukravi (□□□□□□, ukhravi) ukraven, urushi, utsvetela, tudul	Recorded plant part/s and processing techniques[c]	Medi-cinal use cate-gories[d]	Recorded medicinal sub-category and applications[e]	GEO n=45 UR	GEO n=45 CI_s	TUR n=74 UR	TUR n=74 CI_s	Similar(+) or Identical (++) use in the literature[f]	Different use in the literature[g]
CAPRIFOLIACEAE										
Lonicera xylosteum L. (FP-SO 1)	*avi kakası,* *dindiger*	1 fruits, fresh	digest	stomach ache *INT- E 1*	0	0,00	1	0,01	NO	
CORNACEAE										
Cornus mas L. (FP-SO 7) (CK, SO 413*, 1797)	*kızılcık,* *kızılcuk,* *şindanzi,* *şindi,* *çalgı,* *kuku otu;* shindi (□□□□□), kizil (□□□□□), kızılcuk, zoğal	1 fruits, fresh 2 roots, decoction in water 3 fruits, sweet dish (jam)	blood	anemia INT- E 1	1	0,04	0	0,03	++(26) (Geo)	(12) abdominal pain (20) diabetes, insomnia, laxative, wound healing. (21) diabetes. (26) (Geo) anti-inflammatory, diuretic, analgesic, metabolic disturbances, skin diseases, malaria, tonic, eye drop, stomachache. (26)(Arm) gastro-intestinal diseases, vitamin.C, metabolic disorders, gout, skin diseases, anti-inflammatory, reduce temperature, diuretic, choleretic, antiscorbustic, bactericidal, binding agent, rheumatism, malaria, diabetes. (26) (Azr) diabetes, malaria, cold, refreshing, strengthening agent, improve digestion, general health, furuncles.
			digest	diarrhoea *INT- E 1*	0		2		++(13), ++(26) (Azr, Geo)	
				toothache *INT- V 2*					NO	
			cardio	heart disease INT- E 2	1		0		NO	
ELAEAGNACEAE										
Elaeagnus *rhamnoides* (L.) A.Nelson syn: *Hippophae rhamnoides* L. (CK, SO 443) (FP-SO 2)	aplipika, aplepikha (□□□□□□□□, oblepikha), aplipikha, shevi aplipikha, chihan (□□□□□□, ch'ich'khan)	1 fruits, juice	digest	stomach ache INT- D 1	1	0,02	0	0,00	+(12)	(3) antioxidant, bactericidal, strengthens immunity, gastrointestinal diseases, skin diseases. (7) constipation. (8) tonic, prevent from cold. (25) vitamin, diabetes. (26) (Geo) bath for sick children. (26)(Arm) wound healing, burns and radiation injury of skin, gastric and stomach ulcer, cancer, vitamin C. (26) (Azr) vitamin, gastric ulcer, stomatitis, skin diseases, wounds, women diseases.
ERICACEAE										
Rhododendron *caucasicum* Pall.	*çekem,* *çekem ağacı,* *çekeme, cekam,* *pişkeri,* *mşkeri,* *şiker,* *şikeri, şeker dalı,* *şıker, paskar,* *komar,* *kumar,* *zifin, çıkol,* *lişik,* *dağ gülü;* deka, (□□□□,	1 leaves and roots, decoction in water 2 leaves, infusion in water 3 leaves, decoction in water	GHUS	general disease *INT- D 1*	0	0,04	1	0,03	NO	(1) anti-inflammatory, intestinal pain. (11) foul breath. (15) arthritis. (25) diuretic, gallstones, hair loss, hangover, heart, lowers potency, digestive system disorders. (26) (Geo) rheumatism, heart, vascular disorders. (26) (Azr) diaphoretic, diuretic, rheumatism, podagral (gout), fever.
			skin	itching *INT- D 2*	0		1		NO	

Latin names of families and species (voucher or digital photograph number)[a]	Recorded local names[b]	Recorded plant part/s and processing techniques[c]	Medicinal use cate-gories[d]	Recorded medicinal sub-category and applications[e]	GEO n=45 UR	GEO n=45 CI_s	TUR n=74 UR	TUR n=74 CI_s	Similar(+) or Identical (++) use in the literature[f]	Different use in the literature[g]
Rhododendron luteum Sweet **(CK, SO 285*, 102)** (CK, SO 528*, 634*, 747, 809, 1431, 1503, 1663)	*yeli, yel,* *iyeli, komar,* *kumar,* *çikol, şikeri, çekem;* yeli, ieli (□□□□), leshkhi	1 flowers, decoction in water 2 leaves, decoction in water	skin	irritation EXT- B 1	1	0,02	0	0,01	NO	(20) chlorothiazide (lower blood pressure). (22) foot fungus.
			mu-sk	bone and joint pain *EXT- B 2*	0		1		NO	
Rhododendron ponticum L. **(CK, SO 287*, 101, 107, 523)** (CK, SO 387*, 573*, 1435, 1678)	*şikeri,* *komar, kumar,* *laşi,* *mşkeri, şıkeği;* shkeri (□□□□□), shboki	1 leaves, decoction in water	skin	antiseptic EXT- B 1	1	0,02	0	0,00	NO	(3) cardiac. (11) foul breath. (10) headache, eczema. (12) pruritus (itchy skin). (20) skin rubbing. (21) headache. (22) foot fungus.
Vaccinium arctostaphylos L. **(CK, SO 58, 97, 531)** (CK, SO 388*, 650, 665, 801, 1451, 1508, 1685)	*motsvi,* *mortsvi, motsi,* *tikurzanay,* *ağaç motsvi,* *orman üzümü,* *dibda motsvi,* *mahabur,* *yaban mersini, likapa,* maghali motsvi (□□□□□□ □□□□□), motsvi	1 leaves, infusion in water 2 fruits, fresh 3 young branches with leaves, decoction in water, mixed with (*Rubus* sp.) makvali leaves 4 young branches with leaves, infusion in water	endoc	diabetes INT- D 1, 4	4	0,24	0	0,03	+(15), ++ (24), ++ (25)	(3) astringent. (15) stomach diseases. (20) kidney diseases. (24) anemia, inflammation, stomach disorders. (26) (Geo) stomachache, gastrointestinal inflammations.
				gout INT- D 1					NO	
			cardio	high blood pressure INT- D 1	1		0		NO	
			digest	diarrhoea INT- E 2	2		0		+(15), + (26)(Geo)	
			mu-sk	bone and joint pain INT- D 1	2		1		NO	
				bone and joint pain **INT-** E 2, *D 1*					NO	
			skin	eczema INT- D 3	1		0		NO	
			respir	influenza INT- E 2	1		0		+(24)	
			GHUS	general disease *INT- D 1*	0		1		NO	
Vaccinium myrtillus L. **(CK, SO 231*, 520)** (CK, SO 398*, 438*, 598*, 489, 517, 802, 1447, 1506)	*motsvi,* *motçi,* *mortsvi,* *dabali motsvi, mots,* *motsi,* *mosi,* *dağ üzümü,* *mahabur, yabani üzüm, sanako,* *yer motsvi, tikurzena,* *çilek,* *karakiraz,* *karaüzüm, motsu,* *horozgözü, yaban mersini,* *ayı üzümü, mahavur;* motsvi (□□□□□), samkurnalo motsvi, zira motsvi, oghnasho, (□□□□□□, ghoghnosh),muş, mortsvi, çirayi motsvi, yer motsvi	1 fruits, fresh 2 leaves, infusion in water 3 young branches with leaves, infusion in water	eye	eye diseases INT- D 3	2	0,27	0	0,05	NO	(1) cold. (2) cancer. (3) astringent, kidney stone diseases, rheumatism, anemia. (10) bronchitis, tonic. (11) cancer, bronchitis, detoxification, aphrodisiac, relieve stress. (12) intestinal problems, toothache, blood formation. (19) intestinal diseases. (25) dry throat, kidney stones.
				good for eyes INT- E 1					+(3), ++ (11),	
			GHUS	general disease *INT- D 2*	0		1		NO	
			endoc	diabetes **INT- E 1, D 2**, 3	6		2		+(2), ++ (10), ++ (11), ++ (12), + (21), + (25)	
				gout INT- D 2					+(3)	
			digest	constipation INT- E 1	3		0		++(12), + (11), + (21)	
				indigestion INT- D 2					+(2), + (11), + (12)	

Latin names of families and species (voucher or digital photograph number)[a]	Recorded local names[b]	Recorded plant part/s and processing techniques[c]	Medicinal use categories[d]	Recorded medicinal sub-category and applications[e]	GEO n=45 UR	GEO n=45 CI_s	TUR n=74 UR	TUR n=74 CI_s	Similar(+) or identical (++) use in the literature[f]	Different use in the literature[g]
				diarrhoea INT-D 2					NO	
			blood	iron deficiency *INT- D 2*	0		1		NO	
			cardio	haemorrhoids EXT- B 3	1		0		NO	
Vaccinium uliginosum L. (CK, SO 271*)	motsvi (□□□□□)	1 young branches with leaves, infusion in water 2 fruits, fresh	cardio	high blood pressure INT- D 1	1	0,04	0	0,00	NO	(3) astringent
			endoc	diabetes INT- E 2	1		0		NO	
FABACEAE										
Astracantha microcephala (Willd.) Podlech syn: *Astragalus microcephalus* Willd. (CK, SO 479) (CK, SO 392*, 1583, 1713)	*geven, guni;* glerdzi (□□□□□□)	1 roots, fresh 2 fruits, decoction in water 3 roots, burned 4 roots, decoction in water	digest	stomach ache EXT- EM 3	1	0,02	1	0,07	NO	(7) tonic. (8) cracked hand skin. (18) wart, pustule, cracked hand skin, oedema.
				jaundice *INT- D 4*					NO	
			skin	wound *EXT- P 1*	0		2		+(8), +(18)	
				psoriasis *INT- D 4*					NO	
			cardio	varicose vein *INT- D 2*	0		1		NO	
			endoc	diabetes *INT- D 4*	0		1		NO	
FAGACEAE										
Quercus macranthera Fisch. & C.A.Mey. ex Hohen. (CK, SO 438) (CK, SO 1796)	*palut,* *palut ağacı;* dub (□□□), mukha (□□□□), pelut	1 outer barks, decoction in water	respir	throat inflammation EXT- G 1	1	0,02	0	0,00	NO	
Quercus petraea subsp. *iberica* (Steven ex M.Bieb.) Krassiln syn: *Quercus iberica* Steven ex M.Bieb. (CK, SO 126*, 259*) (CK, SO 389*, 434*, 525*, 555*, 565*, 633*, 785, 1046, 1049, 1057, 1487)	*palut,* *pelit,* *pelut,* *pelut ağacı,* *palıt,* *leker,* *neker,* *meşe, ko, koh, çıkoni,* *hozgoni;* mukha (□□□□), dub (□□□), dup, goris tsabli	1 outer barks, decoction in water, one tablespoon, in the morning 2 outer barks, infusion in water 3 outer barks, infusion in water, mixed with roots of *Urtica* sp. (chinchar)	digest	toothache EXT- G 1	11	0,27	0	0,00	+(26) (Geo)	(3) anti-inflammatory. (26) (Geo) rhinitis, poisoning, renal and spleen problems, scurvy, gastro intestinal disorders, stop bleeding from the throat. (26)(Azr) diabetes, astringent, anti-inflammatory.
				diarrhoea INT- D 1, 2					+(26) (Geo)	
				tooth inflammation EXT- G 1					+(26) (Geo)	
				gallbladder INT- D 3					NO	
				stomach ache INT- D 2					NO	
			skin	hair loss INT- D 3	1		0		NO	
GROSSULARIACEAE										
Ribes alpinum L. (CK, SO 457) (CK, SO 624*, 1618, 1701)	*horozgözü,* *kuş gözü,* *moksar, laba ağacı,* *laba, lebe, ağu,* *mehksal,* *yer üzümü,* *lebe ağacı, çiğelem;* mertskhali (□□□□□□□□□) tsiteli motskhari (□□□□□□□□), smorodina, (□□□□□□□□□,smorodina), laba (□□□□), hımoruk	1 fruits, fresh 2 leaves, infusion in water	endoc	diabetes INT- E 1	1	0,04	0	0,00	NO	
			respir	influenza INT- D 2	1		0		NO	

Latin names of families and species (voucher or digital photograph number)[a]	Recorded local names[b]	Recorded plant part/s and processing techniques[c]	Medi-cinal use cate-gories[d]	Recorded medicinal sub-category and applications[e]	GEO n=45 UR	GEO CI$_s$	TUR n=74 UR	TUR CI$_s$	Similar(+) or Identical (++) use in the literature[f]	Different use in the literature[g]
Ribes nigrum L.	*horozgözü,* *meskal,*	1 fruits, fresh	endoc	diabetes INT- E 1	1	0,02	0	0,00	NO	
(FP-SO 8) (CK, SO 1702)	*meskhal, merskhal,* *siyah meksal, it üzümü,* *siyah üzüm, nuksar,* *ağum;* motskari (□□□□□□□), mertskhali, (□□□□□□□□□), smorodina (□□□□□□□□□□), shavi zagla gurdzeni, korkoch, (□□□□□□□□□□, kokrroshen)									
Ribes petraeum Wulfen syn: *Ribes biebersteinii* Berland. ex DC. (CK, SO 288*, 460) (CK, SO 475*, 622*, 1547)	*kuş üzümü,* *horozgözü,* *ayı meyvesi,* *horuk, yerüzümü,* *mehsal,* *meskhal,* *meksal,* *merskali, meskhal;* motskhali, motskhari (□□□□□□□□), smarodina, smorodina (□□□□□□□□□□,smorodina),mertskhali (□□□□□□□□□□),meskhali	1 leaves, infusion in water 2 fruits, vinegar 3 young leaves, infusion in water 4 fruits, sweet dish (compote) 5 fruits, infusion in water 6 fruits, fresh	GHUS	fever INT- D 1, 2, 3	5	0,20	0	0,03	NO	(3) avitaminosis. (7) anemia. (12) urinary disorders.
				good for health INT- E 4					NO	
			respir	cough INT- D 1, 5	2		0		NO	
			endoc	diabetes *INT- E 6*	0		2		NO	
			digest	toothache EXT- G 1	1		0		NO	
			skin	wound EXT- P 1	1		0		NO	
Ribes rubrum L. (FP-SO 9) (CK, SO 58, 1703)	*meskhal,* *çiğelem,* *tuş;* motskarina, motskhari (□□□□□□□□), mertskhali (□□□□□□□□□),zaghıl kurdzena, zagla gurdzeni, smarodina, (□□□□□□□□□□)	1 fruits, sweet dish	GHUS	fever INT- E 1	1	0,02	0	0,00	NO	
Ribes uva-crispa L. syn: *Grossularia reclinata* (L.) Mill. (FP-SO 10) (CK, SO 28*)	*kuş üzümü,* *yabani üzüm;* motskhari (□□□□□□□□), krijovnik (□□□□□□□□□,kryzhóvnik), krujavnik, krojoniki, smorodina, (□□□□□□□□□),korketena, korkachi, kokrochi (□□□□□□□□□□,kokrrosheni),gorgoshena,hagharj (□□□□□□□□□□,□□□□□□, hagharjeni, hagharj)	1 fruits, sweet dish (jam), 1:1 ratio of fruits and sugar, one table spoon 2 leaves, infusion in water 3 fruits, sweet dish (muraba) 4 fruits, drink (juice)	digest	diarrhoea INT- E 3	1	0,13	0	0,00	NO	
			GHUS	fever INT- E 3	1		0		NO	
			respir	cough INT- D 4, 2	4		0		NO	

Latin names of families and species (voucher or digital photograph number)[a]	Recorded local names[b]	Recorded plant part/s and processing techniques[c]	Medi-cinal use cate-gories[d]	Recorded medicinal sub-category and applications[e]	GEO n=45 UR	GEO n=45 CI_s	TUR n=74 UR	TUR n=74 CI_s	Similar(+) or Identical (++) use in the literature[f]	Different use in the literature[g]
JUGLANDACEAE										
Juglans regia L. (CK, SO 516*)	*ceviz,* *cengo,* *zengo,* *gagal,* *ceviz* *zengosu;* kakli, kakal, kakali (□□□□□□), nigozi (□□□□□□), ceviz, orekh (□□□□), ankus (□□□□□□□, ynkuyz*)*	1 pericarp (husk), infusion in water 2 leaves, infusion in water 3 aerial roots, children pass through the aerial	digest	tooth bleaching *EXT- G 1*	0	0,02	3	0,08	NO	(2) cholestrol, foot pain, psoriasis, infection, diabetes, cough. (3) for general health. (8) general tonic, against cold and diabetes. (9) lower cholesterol, blood pressure, diabetes, rheumatismal diseases, back pains, throat ache. (10) lower blood sugar and cholesterol, cleaning wounds, antihelmintic, sprained muscle pains,
			neuro	headache *EXT- H 5*	0		1		NO	
			skin	antifungal *EXT- P 2*	0		1		+(18)	
			GHUS	measles *EXT- RT 3*	0		1		NO	
		root of walnut 4 fruits, fresh 5 leaves, fresh	endoc	thyroid INT- E 4	1		0		+(2), +(12), +(19), +(26)(Azr)	acne, asthma. (11) lower cholesterol, cancer, rheumatism, aphrodisiac, cough, hematinic. (12) cancer, joint pain, kidney stones. (13) sunstroke, haemorrhoids. (14) bleeding. (19) diarrhoea, eczema, wound, hair diseases. (20) high cholesterol (21) high cholesterol. (23) lower blood sugar, abscess, throat diseases. (26)(Geo) atherosclerosis, diabetes, jaundice, cleansing blood, rickets in children, gastrointestinal disorders, gastritis, cardio-vascular diseases, splenomegaly, skin scab, diuretic against urine retention, stomach ache. (26) (Arm) hypotensive, anthracitic, parathyroid gland diseases, wound healing, tonic, styptic, stomach, intestines, kidneys, bladder, women's disases, inflammation of lymph nodes, stomatitis, angina, atherosclerosis, gastritis, enterocolitis, diarrhea. (26)(Azr) inflammation and bleeding of gums, angina, tonsillitis, scurvy, vitamin deficiency, tonic for anaemia, general weakness, against ringworms.
LAMIACEAE										

Satureja spicigera (K.Koch) Boiss.	*kondar,* *kondari;*	1 leaves, fresh	digest	stomach ache INT- E 1, D 3	3	0,16	0	0,00	+(26) (Geo)	(3) respiratory tract, gastrointestinal diseases,

Latin names of families and species (voucher or digital photograph number)	Recorded local names[b]	Recorded plant part/s and processing techniques[c]	Medi-cinal use	Recorded medicinal sub-category and applications[e]	GEO n=45 UR	GEO n=45 CI_s	TUR n=74 UR	TUR n=74 CI_s	NO Similar(+) or Identical (++) use in the literature[f]	NO Different use in the literature[g]
	veluri kondari	2 young aerial parts with flowers, mixed with yoghurt	GHUS cate-gories[d]	general disease INT- D 4	1		0		NO	cardiac, against chronic diarrhea. (21) antihypertensive, cardiac disorder. (26)(Geo)
		3 young aerial parts with flowers, infusion in water	skin	blister EXT- P 2	1		0		NO	Different use in the literature: gums, mouthwash, eyes, kidneys, haemorrhoids,
		4 young aerial parts with flowers, decoction in water, mixed with simindis puncuri (corn silk) and maghadanos (parsley) root, drink three times a day with coffee cup	endoc	diabetes INT- E 2, D 3	2		0		NO	antiflatulent, regulate digestion, metabolism.
LAURACEAE										
Laurus nobilis L.	*defne;* dapna (), dapne, dapnis potoli	1 leaves, infusion in water	digest	toothache EXT- G 1	1	0,02	0	0,00	+(10)	(3) anti-inflammatory. (10) lower cholesterol, against influenza, cold, sniffles, rheumatismal pain, peptic. (11) haemorrhoids, muscle pains, respiratory tract diseases. (19) diabetes, joint calcification, rheumatism. (20) liver and intestinal diseases, rheumatic pains, dyspnea. (21) eczema.
MALVACEAE										
Tilia rubra subsp. *caucasica* (Rupr.) V.Engl. syn: *Tilia caucasica* Rupr. (FP-SO 12) (CK, SO 1765)	*ıhlamur, çaşku, tısaskvi;* tsatskhvi, ()	1 leaves with flowers, infusion in water 2 leaves with flowers, decoction in water	respir	influenza INT- D *1*, 2	2	0,09	3	0,04	+(2), + (11), ++ (21), ++ (22)	(2) stomach disorders. (3) respiratory tract diseases (10) diuretic, diaphoretic, cough, asthma, softens lungs, stomach and intestine problems, inflammatory wounds. (11) cold, bronchitis, respiratory tract diseases, analgesic. (19) cold, bronchitis, haemorrhoids. (21) cold. (22) cold, faucial tonsil, shortness of breath, rheumatism.
				throat ache INT- D *1*, 2					++(22)	
			psych	relaxing INT- D 1, 2	2		0		NO	
ROSACEAE										
Cotoneaster integerrimus Medik.	*kuş elması, kuş üzümü, ayı kakası, kara otu*	1 fruits, fresh	genito	women disease (infertility) INT- E 1	1	0,02	0	0,00	NO	

Latin names of families (FP-SO 2) and species (voucher or digital photograph number)[a]	Recorded local names[b]	Recorded plant part/s and processing techniques[c]	Medi-cinal use cate-gories[d]	Recorded medicinal sub-category and applications[e]	GEO n=45 UR	GEO n=45 CI_s	TUR n=74 UR	TUR n=74 CI_s	Similar(+) or Identical (++) use in the literature[f]	Different use in the literature[g]
(CK, SO 1451)	*yaban elması, tavşan elması, tavşan çalısı, horozgözü, nanaçivikan,yer elması, ayı elması, sorsok, süpürge çalısı, sorısoruk;* chitatskepla (□□□□□□□□□□□),kldevashla									
										(16) jaundice, cough.
Crataegus azarolus L. var. *pontica* (K.Koch) K.I.Chr. syn: *Crataegus pontica* K.Koch (FP-SO 13) (CK, SO 557*, 559*, 1770)	*kırkat, kirkat, datvibaba;* kurkantela (□□□□□□□□□□□)	1 fruits, fresh 2 fruits, sweet dish (pekmez)	cardio	heart disease INT- E 1	1	0,02	0	0,01	NO	
			endoc	diabetes *INT- E 2*	0		1		NO	
Crataegus monogyna Jacq. syn: *Crataegus kyrtostyla* Fingerh. (CK, SO 452, 496) (CK, SO 1784)	*kırkat, alıç, at göti, kiknati, tseti kaka, lebe;* kuneli (□□□□□□□), kirkat, kurkantela (□□□□□□□□□□□), knapi, broseuli, vartan, khurmeli, (□□□□□□□, k'urmela), alucha (□□□□, aloch)	1 fruits, fresh 2 fruits, drink (juice) 3 fruits, sweet dishes (pekmez) mixed with *Rosa* sp. kuşburnu 4 fruits, sweet dish (compote)	genito	kidney disease INT- D 2	1	0,13	0	0,03	NO	
			cardio	heart disease INT- E 1, 4	4		0		+(24), +(26)(Azr), +(23)	(10) vitamin C (tonic). (26) (Azr) diarrhea, refreshing agent.
			endoc	diabetes **INT- E 1**, *3*	1		2		NO	
Crataegus orientalis Pall. ex M.Bieb. (CK, SO 55*, 461) (FP-SO 3)	*kırket, kırkat, ardıç, tatlı baba, boz kiknap, germando, ayı kakası;* alucha, aloch, (□□□□), vartan, kuneli	1 fruits, fresh 2 fruits, infusion in water	cardio	heart disease INT- E 1	2	0,04	0	0,01	+(8)	
	(□□□□□□□), knapi		respir	asthma *INT- D 2*	0		1		+(8)	(2) diabetes, stomach disorders, cough. (17) hypertension.
Crataegus pentagynaWaldst. & Kit. ex Willd. (FP-SO 14) (CK, SO 1788)	*siroğ, karakat, at götü, yabani kırkat, tavşan kakası, kırkatik, kara kırkat;* shavi kuneli (□□□□ □□□□□□), kuneli, kirkat, kriva	1 fruits, fresh 2 fruits, sweet dish (pekmez) 3 fruits, drink (juice) 4 fruits, decoction in water, mixed with *Mentha* sp.	cardio	heart disease INT- E 1, D 4	3	0,07	0	0,03	+(3), +(15), +(24), +(25), +(26)(Geo)	
				vasodilator INT- D 3					NO	(25) hypertension
			endoc	diabetes *INT- E 1, 2*	0		2		NO	

Latin names of families and species (voucher or digital photograph number)[a]	Recorded local names[b]	Recorded plant part/s and processing techniques[c]	Medi-cinal use cate-gories[d]	Recorded medicinal sub-category and applications[e]	GEO n=45 UR	GEO n=45 CI_s	TUR n=74 UR	TUR n=74 CI_s	Similar(+) or Identical (++) use in the literature[f]	Different use in the literature[g]
Crataegus monogyna Jacq. subsp. *monogyna* Pojark. (CK, SO 20*)	kuneli (□□□□□□), tsiteli kuneli, litsvi (□□□□□)	1 fruits, fresh 2 fruits, drink (juice)	cardio	heart disease INT- E 1	2	0,04	0	0,00	NO	
(FP-SO 4)										
Crataegus rhipidophylla Gand. (FP-SO 15) (FP-SO 5)	*datviskaka,* *alıç,* *kırkat, ardıç,* *at götü, kiknap,* *saphanelay*	1 fruits, decoction in water 2 fruits, fresh	eye	eye diseases *INT- D 1*	0	0,00	1	0,03	NO	
			skin	itching *INT- E 2*	0		1		NO	
Mespilus germanica L. (FP-SO 16) (CK, SO 521*, 554*, 1050)	*muşmula,* *muşmullah,* *muşmulah,* *sımartli,* *şartli,* *beş bıyık,* *beş buyuklu;* mushmula (□□□□□□□, mushmulá) mushmulah, ezgil, smartli, zgmartli (□□□□□□□□)	1 flowers, infusion in water 2 fruits, fresh 3 leaves, infusion in water, mixed with grape leaves	endoc	diabetes *INT- E 2*	1	0,07	1	0,01	++(2), ++(21)	(2) sedative. (12) kidney problems. (21) hypertension. (22) diarrhea, shortness of breath, cardiovascular diseases, intestinal worms. (26)(Geo) varicose veins, scabies, inflamed digestive tracts, urolithiasis. (26)(Arm) kidney diseases, haemorrhoids, gastrointestinal diseases, urinary calculi, washings (lavages), malignant tumors. (26)(Azr) astringent, diarrhea, dysentery, haemorrhoids, angina, laryngitis, toothache.
				thyroid INT- E 2					NO	
			cardio	heart disease INT- D 1	1		0		+(22)	
			mu-sk	bone and joint pain INT- D 3	1		0		NO	
Prunus padus L. syn: *Padus avium* Mill. (FP-SO 3) (CK, SO 1593, 1700)	*karakiraz,* *karaağaç,* *dilburan,* *yaban kirazı;* tkis bali, tciron	1 fruits, fresh	GHUS	vitamin deficiency *INT- E 1*	0	0,00	1	0,01	NO	(25) diarrhea.
Prunus avium (L.) L. syn: *Cerasus avium* (L.) Moench (FP-SO 4) (CK, SO 402*, 33, 859, 1052, 1061, 1445, 1626, 1662)	*vişne, kiraz,* *yabani kiraz,* *acı kiraz,* *bali, vai kiraz, tsare bali, yaban kirazı, kiraz,* *pici bali, buli,* *mır kirazı;* bali (□□□□), alubali, veluri bali, vishnish potoli, vishnai, tkis bali, gareuli bali, mamlis siskli	1 fruits, fresh 2 fruits, decoction in water 3 leaves, decoction in water	genito	high menstrual bleeding INT- D 2	1	0,02	1	0,03	NO	
				vaginal discharge *INT- D 3*					NO	
			blood	anemia *INT- E 1*	0		1		NO	

Latin names of families and species (voucher or digital photograph number)[a]	Recorded local names[b]	Recorded plant part/s and processing techniques[c]	Medi-cinal use cate-gories[d]	Recorded medicinal sub-category and applications[e]	GEO n=45 UR	GEO n=45 CI_s	TUR n=74 UR	TUR n=74 CI_s	Similar(+) or Identical (++) use in the literature[f]	Different use in the literature[g]
Prunus divaricata Ledeb. (CK, SO 453, 459, 464)	*cancur,* *çarçur,* *tomun,* *yabani erik,* *sarol,*	1 fruits, fresh 1 fruits, vodka and salt	stom	stomach EXT- P 1	1	0,13	0	0,04	NO	
(CK, SO 35, 1539, 1646)	*thkemali,* *can erik,* *erik, salur, temal,* *yabani sarı erik, çanşur,* *muş, temal,* *muig;* tkemali (□□□□□□□), tkhemali salvor, shavi tkhemali, cancur, canculi, dambul	2 fruits, sweet dish (pestil-kılapi) 3 fruits, mixed with honey 4 fruits, sweet dish (ezme) 5 roots, decoction in water	mu-sk	bone and joint pain EXT- P 1	2		1		NO	(3) against avitaminosis. (26)(Azr) cough, angina, tonic, antiscorbutic, wounds, against blastemal.
				sprain *EXT- P 3*					NO	
				back pain EXT- P 3					NO	
			respir	throat ache INT- E 3	2		0		NO	
				lung disease INT- E 3					NO	
			cardio	haemorrhoids *INT- D 5*	0		1		NO	
			endoc	diabetes *INT- E 4*	0		1		NO	
			digest	stomach ache INT- E 2	1		0		NO	
Prunus laurocerasus L. syn: *Laurocerasus officinalis* M. Roem. (CK, SO 53, 83) (FP-SO 6)	*karayemiş,* *tskavi,* *zevağh, karakiraz,* *kiraz, msko;* tskavi (□□□□□), tsisay	1 leaves, decoction in water 2 fruits, sweet dish (jam) 3 fruits, fresh	neuro	headache *INT- D 1*	0	0,02	1	0,03	+(21)	(3) cardiac. (10) diabetes, ulcer, kidney diseases, cough, spasm, sprained muscle pain, disinfectant for burns. (11) hemorrhoids, diabetes. (19) Cardiac distress, diabetes, mumps, burns, wounds, analgesic, eye diseases, hair diseases. (20) fracture and pain, cracks in the skin, expectorant, diabetes, ingrown nails, iron deficiency. (21) hypertension.
			blood	hematinic *INT- E 2*	0		1		NO	
			cardio	haemorrhoids INT- E 3	1		0		NO	
Pyrus communis L. (CK, SO 22*, 450, 462) (CK, SO 445*, 55, 1036, 1054, 1632, 1642)	*panta,* *armut,* *yabani panta, kazbudi,* *yaban armudu;* panta (□□□□□), panta mskeli, gareuli mskali, mskali (□□□□□□, mskhali)	1 fruits, drink (vodka) 2 fruits, drink (juice)	digest	stomach ache INT- D 1	2	0,04	0	0,00	+(26)Geo	(15) diabetes, urinary problems. (26)(Geo) diarrhea, gastrointestinal inflammation, tuberculosis, urinary stones, sores. (26)(Azr) astringent, fixative, wounds.
				constipation INT- D 2					NO	
Rosa boissieri Crép. (CK, SO 29*, 62*, 122*, 507) (FP-SO 7)	*kuşburnu,* *diken, tiken, askil, eskil, güz askili, dıbılga,* *eskil, esgül, eskül;* askili (□□□□□□), kera askili, shek masur, masur (□□□□□□), krasni	1 fruits, fresh 2 fruits, decoction in water 3 roots, decoction in water	genito	kidney disease INT- D 2	3	0,09	0	0,04	++(7)	(7) haemorrhoids .
				incontinence urine INT- D 2					NO	
			GHUS	vitamin deficiency INT- E 1	1		0		NO	

Latin names of families and species (voucher or digital photograph number)[a]	Recorded local names[b]	Recorded plant part/s and processing techniques[c]	Medi-cinal use categories[d]	Recorded medicinal sub-category and applications[e]	GEO n=45		TUR n=74		Similar(+) or Identical (++) use in the literature[f]	Different use in the literature[g]
					UR	CI[h]	UR	CI[h]		
Rosa canina L. (CK, SO 465) (CK, SO 1496, 1698, 1712, 1791)	*kuşburnu,* *şilan,* *diken,* *ekali, yaz askili;* askili (□□□□□□), masur (□□□□□□), shipovnik (□□□□□□□□),cherepidza	1 fruits, infusion in water 2 fruits, decoction in water 3 roots, decoction in water 4 fruits, fresh 5 fruits, sweet dish (marmalade) 6 roots, infusion in water	digest	intestinal disease *INT- D 3*	0		1		+(7)	(2) diabetes, cholesterol, sedative. (3) polyvitamini, bactericidal, antiinflammatory, regulator of gastrointestinal tract, diuretic. (5) ulcer, gastritis. (6) intestine ache, asthma. (7) dyspnea, rheumatism. (8) against indigestion, prevent cold. (9) preventive. (10) diabetes. (11) cold, bronchitis, respiratory tract diseases. (13) bronchitis. (16) tonic, asthma. (17) cold. (21) cold, diabetes. (22) constipation. (23) diabetes, (26)(Azr) sudorific, antipyretic, fever, bronchitis , tuberculosis, , improve digestion, diarrhea, anastaltic for internal hemorrhages, light laxative, wounds, burns, psoriasis, antidiabetic, liver and gallbladder diseases, rheumatism, heart disease, relieve fatigue, improve appetite. (26)(Geo) heartache, eye hemorrhage, swelled palate, burns, gum bleeding, enhances gull secretion, snake bites, diuretic, liver diseases, stomach colic's, refreshing body, mouth wash, narcotic(painkiller) for bladder stones, thyroid problems, for people bitten by dogs with rabies.
			respir	shortness of breath *INT- D 3*	0		2		NO	
				cough *INT- D 2*					NO	
			genito	kidney disease INT- D 6	9	0,31	0	0,14	+(26)Geo,	
				prostate INT- D 1					++ (26)Geo	
				kidney pain INT- D 1					NO	
				kidney stone INT- D 2					+(16)	
			cardio	haemorrhoids INT- D 1, *2, 4, E 5; EXT- B 2*	2		4		+(11), +/++(13), +(14), ++ (22)	
			blood	cleansing blood INT- D 1	1		1		NO	
				anemia *INT- E 4*					+(26)Azr	
			digest	stomach ache INT- D 1, 2	2		1		+(2), + (14), ++ (22), + (26)Geo,	
				gall disease *EXT- B 2*					NO	
			respir	cough *INT- D 2, 3*	0		3		+/++(6), ++(10), +/++(13), +(14), ++ (16), + (21), + (26)Geo, +(26)Azr	
				influenza *INT- D 3*					+(2), +(5), +(11), + (17), + (21)	
			GHUS	general disease *INT- D 3*	0		1		+(26)Geo,	
Rosa hirtissima Lonacz. (FP-SO 17) (FP-SO 8)	*kuşburnu,* *tiken,* *gül dikeni,* *eskül;* askili (□□□□□□), masur (□□□□□□), grosni	1 fruits, decoction in water 2 fruits, infusion in water	genito	kidney disease INT- D 1	2	0,09	0	0,01	NO	
			GHUS	tiredness and weakness INT- D 2	1		0		NO	
			digest	stomach ache INT- D 1	1		1		NO	
Rosa mollis Sm. (CK, SO 264*, 280*) (FP-SO 9)	*kuşburnu,* *esgül,* *eskül, dıbılga;* askili (□□□□□□)	1 fruits, decoction in water 2 fruits, infusion in water, mixed with *Helichrysum*	GHUS	general disease INT- D 1	2	0,11	0	0,01	NO	
				vitamin deficiency INT- D 1					NO	
			cardio	heart disease INT- D 1	1		0		NO	
			genito	prostate INT- D	0		1		NO	

Latin names of families and species (voucher or digital photograph number)[a]	Recorded local names[b]	Recorded plant part/s and processing techniques[c]	Medi-cinal use categories[d]	Recorded medicinal sub-category and applications[e]	GEO n=45 UR	GEO n=45 CI_s	TUR n=74 UR	TUR n=74 CI_s	Similar(+) or Identical (++) use in the literature[f]	Different use in the literature[g]
		3 leaves, decoction in water								
Rosa spinosissima L. syn: *Rosa pimpinellifolia* L. (CK, SO 274) (CK, SO 615*, 24, 1019, 1024, 1529, 1669, 1711)	*askil, dıbılga, eskül, esgül, kara eskül, kara kuşburnu, karadiken, şilan, kargın, kuşburnu, diken, ekli kakay;* shavi askili (□□□□ □□□□□□), tkis askili, masur (□□□□□□), chorni, shipovnik (□□□□□□□□)	1 fruits, fresh 2 fruits, infusion in water, 3 times per day 3 fruits, decoction in water 4 roots, decoction in water 5 roots, infusion in water	blood	anemia *INT- D 3*	0	0,09	1	0,32	NO	(8) stomach bloating. (18) diarrhea.
			GHUS	vitamin deficiency INT- E 1	2		2		NO	
				general disease *INT- D 4*					NO	
				tiredness and weakness INT- D 2					NO	
			cardio	blood pressure INT- D 2	2		7		NO	
				haemorrhoids *EXT- B 3, 4; INT- D 3, 4*					+(7), ++(8), ++(9), ++(16), +(18)	
				hearth disease INT- E 1					+(16)	
			respir	influenza *INT- D 4*	0		7		++(6), ++(5)	
				shortness of breath *INT- D 4*					NO	
				bronchitis *INT- D 4*					NO	
				cough *INT- D 3, 4*					+(8), ++(16)	
			neuro	headache *INT- D 2*	0		2		NO	
				dizziness *INT- D 5*					NO	
			digest	stomach ache *INT- D 2*	0		4		++(6)	
				intestinal disease *INT- D 4*					+(7), +(8)	
				stomach ache *INT- D 3*					+(8), ++(16)	
				clean intestine *INT- D 4*					NO	
			genito	prostate *INT- D 3*	0		1		NO	
Rosa villosa L. (CK, SO 451, 497) (CK, SO 1118, 1528, 1594, 1769)	*kuşburnu, dıbılga,dal*	1 fruits, decoction in water 2 roots, infusion in water	digest	stomach ache *INT- D 1*	0	0,00	1	0,03	NO	
			respir	cough *INT- D 2*	0		1		NO	
Rubus caesius L. (CK, SO 90) (FP-SO 10)	*markvala;* makvala, makvali (□□□□□□□, mak'vali), bardi	1 roots, decoction in water	genito	kidney disease INT- D 1	1	0,02	0	0,00	NO	(2) cardiovascular diseases, diabetes, stomach, cough, cancer, menstrual disorders. (3) against vitamin deficiency, body sanative, sedative. (6) antioxidant. (8) general tonic. (12) eczema, haemorrhoids, psoriasis, infertility, blood stopper.
Rubus caucasicus Focke	*böğürtlen, markvala, yuh, yuğ, kantğu*	1 fruits, fresh	respir	cold INT- E 1	1	0,04	0	0,00	NO	

Latin names of families and species (voucher or digital photograph number)[a]	Recorded local names[b]	Recorded plant part/s and processing techniques[c]	Medi-cinal use cate-gories[d]	Recorded medicinal sub-category and applications[e]	GEO n=45 UR	GEO CI_s	TUR n=74 UR	TUR CI_s	Similar(+) or Identical (++) use in the literature[f]	Different use in the literature[g]
(CK, SO 516) (CK, SO 636, 1432, 1505)	*kara jol,* *makvali,* *böğürlen, yuğ;* makvali (□□□□□□□), makvala, tkis martskvi, jolo (□□□□), malina (□□□□□□)	2 leaves, decoction in water, mixed with *Vaccinium* sp. and *Rubus idaeus* leaves	skin	eczema INT- D 7	1		0		NO	
									NO	
Rubus idaeus L. (CK, SO 168*, 94, 454) (CK, SO 348*, 408*, 417*, 468*, 601*, 812, 1021, 1504, 1530, 1675)	*ahududu,* *ananın lokması,* *böğürtlen, coli,* *ciğelek,* *ciğelem,* *çilek,* *kuş üzümü, nanibiri, kırmızı jol,* *hırva,* *horozgözü,* *jol, jola, jola ağacı, jolay,* *jolo, jöle, kulluk,* *laba, tıri, yuğh, makval,* *mjoli, yabani üzüm;* jolo (□□□□, zholo), joli, malina (□□□□□□), makvali (□□□□□□□), smorodina (□□□□□□□□□), yejevika (e□□□□□□, yezhevika) çilek, klupnika, (□□□□□□□□□, klubnika) koyungözü, yelak	1 young leaves, infusion in water 2 leaves, infusion in water 3 fruits, sweet dish (jam), 1:1 sugar: fruit, boil 5 min., one table spoon 4 fruits, sweet dish (compote) 5 leaves, decoction in water, mixed with *Vaccinium* sp. leaves	respir	throat ache INT- D 1	3	0,16	0	0,00	NO	(3) against vitamin deficiency, sudorific. (5) stomach health, hair lost and hair greying. (8) general tonic. (10) constipation. (13) cure sterility. (20) haematinic. (22) lower sugar and cholesterol level, prostate and urinary tract problems. (23) strenghten uterus and pelvic muscles, relieve labor pain and ease the birth. (25) wounds.
				influenza INT- D 2					+(25)	
			GHUS	cleaning organs INT- D 2	2		0		NO	
				fever INT- E 4					+(3)	
			cardio	heart disease INT- E 3	1		0		NO	
			skin	eczema INT- D 5	1		0		+(10)	
Sorbus aucaparia L. syn: *Sorbus caucasigena* Kom. ex Gatsch. (CK, SO 75, 456) (CK, SO 390*, 421*, 447*, 594*, 626*, 1459, 1591, 1660)	*çinav,* *cınav,* *cinavi, çıknavi, çinav,* *çinyavi, dilyavay, siro, dolık,* *ayı kakası,* *ayının yemişi,* *avi kakası, cahole, yemişihörçi;* chknavi, (□□□□□, ch'navi), chakvela (□□□□□, ch'vakha), ryabina (□□□□□□□), zınzek, giloz, zaghıl kurdzena	1 fruits, fresh 2 fruits, infusion in water	endoc	diabetes INT- E 1	1	0,04	5	0,11	+(26)(Azr, Arm)	(3) against vitamin deficiency, sudorific, antipyretic. (5) appetizing. (15) digestive, urinary problems. (24) wounds. (25) cramps, heart diseases. (26)(Arm) thyrotoxicosis, atherosclerosis, immunodeficiency, low acidity gastritis, anemia, antitumor, antisclerotic, anti-inflammatory, hypotensive, regulating pressure and digestion, formation and removal of bile. (26)(Azr) cold, sudorific, antipyretic, gastroenteric diseases, dysentery, diuretic, laxative, anastaltic, vitamin supplement.
			respir	asthma *INT- E 1*	0		1		NO	
			digest	stomach ache *INT- E 1*	0		1		NO	
			cardio	haemorrhoids INT- E 1	1		1		+(26) (Azr)	
				high blood pressure *INT- D 2*					+(24), +(25), +(26)(Arm)	
SALICACEAE										
Salix caprea L. (CK, SO 61*, 192*, 212*	*neker,* *yabani söğüt,* *söğüt, ahlık, kara söğüt*	1 flowers, infusion in water	eye	eye diseases EXT- P 1	1	0,02	0	0,00	NO	

Latin names of families and species (voucher or digital photograph number)[a]	Recorded local names[b]	Recorded plant part/s and processing techniques[c]	Medi-cinal use cate-gories[d]	Recorded medicinal sub-category and applications[e]	GEO n=45 UR	GEO n=45 CI_s	TUR n=74 UR	TUR n=74 CI_s	Similar(+) or Identical (++) use in the literature[f]	Different use in the literature[g]
(CK, SO 506*, 522*, 1034)	*tityili söğüt, dıgnali, yaban söğüdü, yabani söğüt, esas söğüt;* tiripi (□□□□□□), dzetsna, dzetsni (□□□□□), tsnori (□□□□□), tsitsala, tsitsela (□□□□□□)									(3) laxative. (15) analgesic. (25) arthritis, gallstones, kidneys problems.
Salix sp. **(CK, SO 208*)** (CK, SO 1405, 1792)	*çisa söğüdü, kuru söğüt, meşe söğüdü, sarı söğüt, söğüt, tutula, tutulay, yabani söğüt, çişe, kınalı, köy söğüdü;* mdgnali (□□□□□□□), ur, latso ureni (□□□□□□, urreni), dzetzna (□□□□□), tsitsera, tsaitselay, chichatsvetvi	1 leaves, infusion in water 2 young branches, warmed on stove 3 branches, pray on *Salix* sp. branches and make a notch on it as the number of warts you have, when it fall down from roof, wart disappear	GHUS	vitamin deficiency INT- D 1	1	0,04	0	0,01	+(4)	(9) rheumatismal pains, sunstroke, skin infections.
			mu-sk	sprain EXT- P 2	1		0		NO	
			skin	wart (meçeça) *EXT- RT 3*	0		1		NO	
SANTALACEAE										
Viscum album L. **(FP-SO 5)**	*pintri, fitri, pitğri, fitiri, pintiri, çaabu, iphri;* pitri (□□□□□) pintri	1 aerial parts, infusion in water 2 leaves, infusion in water 3 fruits, macerated	genito	abortion *INT- D 1*	1	0,04	1	0,03	NO	(3) sedative. (11) hypertension. (20) atherosclerosis, bronchial problems. (22) heart diseases, lower blood sugar, gastritis, lower blood pressure, bronchitis, vasodilator, vessel stiffness. (21) cardiovascular diseases. (25) heart, hypertension.
				urinary disease INT- D 2					NO	
			skin	wart (meçeçi) EXT- P 3	1		0		NO	
			respir	asthma *INT- D 2*	0		1		+(20), +(21), +(22)	
THYMELAEACEAE										
Daphne mezereum L. **(FP-SO 18)** (CK, SO 608*, 1259, 1476)	*mayasır, yaban çileği, sürüvandi*	1 branches with leaves, decoction in water	cardio	hemorrhoids, *EXT- B 1*	0	0,00	1	0,01	NO	(3) anti-gangrene. (25) toothache (26)(Azr) antiseptic and fungicide in scab, fungus diseases and insect bites, vitiligo, ulcerous wound, urethritis, anthelmintic, toothache, hemorrhages, neuralgic and rheumatic problems.

[a] "FP-SO (number)": Field photo number of the specimen by Soner Oruç, "CK, SO (number)": Voucher number of species collected by Ceren Kazancı and Soner Oruç. **Bold** numbers indicate specimens from Georgia, the others from Turkey. * represents specimens from 2017 fieldwork; the others from 2018.

[b] Recorded local names of species (including dialects with phonological and lexical variations) in both countries during this fieldworks. Names written in *Italics* are from Turkey, the rest are from Georgia. When exactly the same local/common names were recorded, the correct spelling was showed in parenthesis with Georgian, Russian, Armenian alphabet (retrieved from 74,75).

[c] Each different number (1,2,3...) indicates a single preparation of a remedy.

[d] digest: Digestive, respir: Respiratory, cardio: Cardiovascular, skin: Skin, endoc: Endocrine, GHUS: General health and unspecified, genito: Genitourinary, mu-sk: Muscle-Skeletal, blood: Blood, eye: Eye, neuro: Neurological, psych: Psychological.

[e] Ailments written in **bold** are shared reports between participants in both country. The rest of the reports are either from Georgia or from Turkey depending on their application methods. Applications written in *Italics* are associated with the knowledge from Turkey; **Bolds** are for both countries, the rest are from Georgia. Each number (1,2,3...) at the end of applications match with the process number of the remedy (see in above "[c]"). INT: Internally (D: drink, E: eaten, C: chew, V: inhalation of vapor, RT: ritual); EXT: Externally (P: plaster, G: gargle, S: salve, B: bath, EM: embrocation, H: headbands, RT: ritual).

[f] "+" before the reference number indicates that related medicinal use and sub-category of the plant species are same; but recorded use part or/and processing techniques are different.

"++" indicates that related medicinal use category, sub-category, use part and processing techniques are identical.

"NO" indicates that "not any similar report have been specified" in the cited references.

[g] Reference numbers without any plus sign indicates a report of related plant species with different medicinal sub-category than reports of this study. Review of historical and contemporary use information from main texts of Georgian, Armenian, Azerbaijanian (including USSR, Caucasus) flora, medicinal plants and folklore sources reported in reference (26) were indicated separately. Geo: Georgia, Arm: Armenia, Azr: Azerbaijani. However, (26)(Geo) does not include reports from Bussmann's and his colleagues' recent works in Georgia. These are also cited separately as [12,14,16,17].

References cited in the table: **(1) 14**; **(2) 21**; **(3) 25**; **(4) 19**; **(5) 23**; **(6) 76**; **(7) 77**; **(8) 78**; **(9) 79**; **(10) 80**; **(11) 81**; **(12) 82**; **(13) 20**; **(14) 83**; **(15) 17**; **(16) 84**; **(17) 85**; **(18) 86**; **(19) 87**; **(20) 88**; **(21) 89**; **(22) 90**; **(23) 91**; **(24) 12**; **(25) 16**; **(26) 18**

Cultural Importance (CI) index of families, genera and species

Figure 4 shows the cultural importance (CI) index of each family reported in Georgia and in Turkey. Out of 23 woody plant families recorded on the whole study area, 14 of them were recorded in both countries whereas 7 of them were only from Georgia and 2 of them were only from Turkey. The three most important families according to CI index in order of importance in Georgia are Rosaceae, Pinaceae and Ericaceae, while in Turkey they are Rosaceae, Pinaceae and Berberidaceae. The most important genera in these families in order of importance are *Rosa*, *Pinus*, *Picea*, *Vaccinium* and *Ribes* in Georgia and *Picea*, *Rosa*, *Berberis*, *Pinus*, and *Crataegus* are in Turkey (Fig. 5.).

The CI index of the Pinaceae family in Georgia is almost twofold that of Turkey. Significant differences are also noted at the species level. While *Pinus sylvestris* (CI 0.67) is the most important species following *Picea orientalis* (CI 0.60) on the Georgian side, in Turkey *Picea orientalis* (CI 0.58) is the most important, with *Pinus sylvestris* having a very low value (CI 0.12). Indeed, during fieldwork in Georgia, the sale in local bazaars of fresh *Pinus sylvestris* cones and pollens as a medicine was frequently observed, traders inviting shoppers to taste their pollen. One participant offered jam made of young seed cones of *Pinus sylvestris*. This events revealed the continuing existence of a living traditional phytomedicine heritage in Georgia. In contrast, no participant in Turkey gave any clue of similar traditions related to *Pinus*. In fact, most were astonished to hear of the usage of *Pinus* cones as a jam. Although the species is homogeneously distributed across the study area, and used across the border in various ways (material, construction, fuel), the greatly contrasting high medicinal CI values in Georgia and very low CI values in Turkey might be associated with participants' in Georgia accessing medicinal knowledge in multilingual literature resources. The high regard of local people for the Russian name, "sosna", for *Pinus sylvestris* might be a reflection of multilingual literature on medicinal knowledge in Georgia. The Rosaceae family is seen to have the highest number of genus (5 in Georgia; 6 in Turkey) in both countries. The CI index value of the *Rosa* genus (0.69) in Georgia and in Turkey (0.55), comprise approximately half of the CI value of Rosaceae in both countries. Although several *Rosa* species have been recorded for medicinal use, a particular selection between two different species between two countries is noted. While *Rosa canina* with a CI of 0.31 is the most important *Rosa* species in Georgia; *Rosa spinosissima* (syn. *R. pimpinellifolia*) with a CI of 0.32 is the most important *Rosa* species in Turkey, being more than threefold that the CI index of *R. spinosissima* in Georgia (0.09). The small CI index value of *Rosa spinosissima* in Georgia may be due to the fact that it has a narrow distribution and low abundance in Georgia. However, as far as observed, this species has a relatively wider distribution and high abundance in Turkey. Another possible and more plausible explanation is that the particular medicinal use of this species in Turkey, especially in Ardahan, could be related to similar

cultural background and unique ethnomedicinal knowledge of the people living there. The frequent use of *Rosa spinosissima* roots as medicinal tea in this province is an uncommon medicinal use, which has so far rarely been cited in the literature in Turkey. *O*ne previous report was from Çıldır, Ardahan [23] within the area of this study, while a further two more reports were from the nearby region, in Erzurum [78,79]. Consensus in this traditional knowledge in Ardahan is likely to reflect the therapeutic efficacy of this plant, a point of interest to be noted for further ethnobotanical and ethnopharmacological studies. Other most cited genera of the Rosaceae family, such as *Crataegus* spp., *Prunus* spp. and *Rubus* spp., are represented in the culturally important top ten genera in both countries, except for *Rubus spp.,* which have no medicinal use citation from participants in Turkey.

Another notable result is that, although the third family in the CI index rating differs in the two countries (Ericaceae in Georgia, Berberidaceae in Turkey), the Berberidaceae CI in both Turkey and Georgia are very close to each other (0.22 in Georgia; 0.20 in Turkey). However, the Ericaceae family CI in Georgia is significantly greater than that in Turkey, being 0.65 and 0.12 respectively. Even the reported genera in both regions are the same (*Vaccinium* and *Rhododendron*); *Vaccinium* with CI of 0.56 in Georgia and 0.08 in Turkey is a sign of significant differences between the two countries. Actually, *Vaccinium* is a widely known, reported and used plant species as a fruit in the study area, in Turkey. Therefore, its low medicinal CI value could be related to its less known specific medicinal properties.

Interestingly, fourth and fifth mostly cited families in Georgia, Grossulariaceae and Fagaceae are not represented in CI index of top ten families in Turkey. Regarding Grossulariaceae, although *Ribes* spp. have CI value of 0.42 in Georgia, it has CI value of 0.03 in Turkey. The relatively high medicinal CI of *Ribes* spp. in Georgia might originate from the effects of literature sources of Russian pharmacopeia. Indeed, the use of Russian plant names such as "*smarodina*" and "*krujavnik*" by participants (only Russians and Armenians in this case) when mentioned the medicinal usage of *Ribes* spp., could be indicative of such an effect. On the other hand, while *Quercus* spp. representing Fagaceae family have a CI value of 0.29 with 13 URs in Georgia, no mention from Turkey was made of any medicinal use for these species. The authors do not know of any reports of medicinal usage of *Quercus* species in previous studies conducted in the Turkish part of the Caucasus (see Table 3 for references) or even in any ethnomedicinal review for East Anatolia [92]. However, it has been mentioned in the literature from Georgia and Azerbaijan [Kopaliani, Tsutsunava, Mindadze and Damirov cited in 93,15,25]. Thus, the variety of medicinal use knowledge for *Quercus* spp. recorded in Georgia may be attributed to cultural background as well as to the remedies written in the literature, especially in ancient traditional medical books. Indeed, when participants were asked about the origin of their ethnomedicinal knowledge, although most in Georgia referred to their elders' knowledge as a primary source, some also acknowledged their primary school education and others recalled Russian botanists who had conducted research in the region. Furthermore, several referred to the 15th century Georgian "Karabadini", which had formerly been known as "Ustsoro Karabadini", the first almanac of medicinal remedies and medicinal knowledge, written by Kananeli Karaba in the 10th century. A further source of knowledge mentioned was the "Turmanidze family", an acknowledged traditional Georgian medical family. Some also made a reference to Russian medicinal plant guidebooks and web pages. In contrast, no similar examples came from participants in Turkey, whose sole source of plant knowledge was their elders and people around. They also complained about lack of scientifically sound medicinal plant resources in Turkish. Georgian participants' multilingualism enabled them to access a diverse range of literature related to medicinal plants that could account to some degree for the resulting variation in people's ethnomedicinal knowledge across this border.

Plant parts used and preparation and administration methods

More than one plant part is known/used medicinally for 37% of wild woody plants mentioned in Georgia and 38% of them in Turkey. Most commonly, the bearing of fruit is given for 37.2% of the URs in Georgia and 29.3% of URs in Turkey. The significant value of woody plants as a food (either eaten for nutrients or used medicinally) could explain this result for researched communities. The use of leaves and resin comes after fruit use in Georgia, while resin and root follow this in Turkey (Table 4). It is understandable that roots (14.9% of UR) have a higher importance in Turkey than in Georgia (3.2% of UR). Because a major contribution (78% of root UR) to root usage in Turkey originates from *Rosa* spp. especially the unique use of *Rosa spinosissima* root.

Among the preparation methods, the most common one in Georgia is infusion in water (39.5% of URs), whereas in Turkey decoction in water is the most common one (37.1% of URs). They are followed by decoction in water (21.4%) and fresh use (17.2%) in Georgia; fresh use (27.5%) and infusion in water (14.6%) in Turkey (Table 4). Significant contribution of leaves, pollens and fruits in Georgia versus roots and branches in Turkey might explain the marked difference of decoction vs. infusion among studied communities.

Relatively low fresh use in Georgia could be related to preference of various culturally specific preparation methods for fruits such as sweet dishes, mixing fruits with honey or vodka.

A major application method in both countries is internally, specifically, drinking or eating. In Georgia, drinking and eating constitute 55.1% and 19.8% of the URs respectively, in Turkey the corresponding UR data are 37.9% and 21.3% respectively. Plastering, with UR percentages of 8.9% in Georgia and 14.9% in Turkey, follows them as an external application.

Table 4 Comparison of URs (%) for plant parts used, preparations and applications in Georgia and in Turkey*

Plant parts used	UR (%) Geo	UR (%) Tur	Preparations	UR (%) Geo	UR (%) Tur	Applications	UR (%) Geo	UR (%) Tur
fruits	37,2	29,3	infusion in water	39,5	14,6	drink	55,1	37,9
resin	10,4	25,4	decoction in water	21,4	37,1	eat	19,8	21,3
leaves	19,2	12,2	fresh	17,2	27,5	plaster	8,9	14,9
roots	3,2	14,9	macerated	5,5	14	chew	3,2	10,9
branches	2,8	9,4	sweet dish	7,6	3,9	bath	4,5	9,2
young seed cones	4,8	2,8	mix with honey	3,4	1,1	gargle	6,1	2,3
pollen cones	5,6	0,6	juice and vodka	2,5	-	inhalation	1,6	0,6
outer barks	5,2	-	mixed with yoghurt	0,8	-	ritual	0,4	1,7
flowers	4	-	passing under tree	-	0,6	embrocation	0,4	0,6
aerial parts	2,4	-	juice	-	0,6	salve	-	0,6
young seed cones and pollen cones	2,4	-	dried and powdered	-	0,6			
inner barks	0,8	1,1	decoction in milk	0,4	-			
pericarp/ husk	-	1,7	infusion in sugar	0,4	-			
entire plant	1,6	-	vinegar	0,4	-			
seeds	-	0,6	warmed on stove	0,4	-			
aerial roots	-	0,6	burned	0,4	-			
heartwood	0,4							

* Note that the information (words) in each row do not match with each other (See in Table 3 for the preparation and application of each plant part). Information was ranked in accordance of importance based on mean UR (%) values of the countries.

To summarise, communities in both countries utilize many parts of wild medicinal woody plants, with a variety of modes of preparation and application methods. However, the most common way of using shrubs and trees medicinally in Georgia is drinking the infusion water of fruits and leaves, while in Turkey drinking the decoction water of fruits and roots.

Medicinal use-categories and salient species

In the study area on either side of the Georgian-Turkish border the cultural importance of medicinal use categories as well as salient species used varies significantly among communities.

Table 5 Number of use reports (URs), number of species and CI, FIC values for each medicinal use category [a].

Medicinal use	Turkey				Georgia			
categories	# UR (%)	# of spp.	CI	FIC	# UR (%)	# of spp.	CI	FIC
Digestive	58 (32,0%)	17	0,78	0,72	59 (23,6%)	20	1,31	0,67
Respiratory	24 (13,3%)	12	0,32	0,52	51 (20,4%)	16	1,13	0,7
Cardiovascular	17 (9,4%)	8	0,23	0,56	32 (12,8%)	20	0,71	0,39
Skin	29 (16,0%)	10	0,39	0,68	24 (9,6%)	16	0,53	0,35
Endocrine	20 (11,1%)	11	0,27	0,47	21 (8,4%)	12	0,47	0,45
GHUS	8 (4,4%)	7	0,11	0,14	24 (9,6%)	16	0,53	0,35
Genitourinary	8 (4,4%)	8	0,11	0	23 (9,2%)	12	0,51	0,5
Muscle–skeletal	7 (3,9%)	5	0,09	0,33	8 (3,2%)	6	0,18	0,29
Blood	5 (2,8%)	5	0,07	0	2 (0,8%)	2	0,04	0
Eye	1 (0,6%)	1	0,01	-	3 (1,2%)	2	0,07	0,5
Neurological	4 (2,2%)	3	0,05	0,33	1 (0,4%)	1	0,02	-
Psychological	-	-		0	2 (0,8%)	1	0,04	1
Total	181 (100%)	40[b]	2,45		250 (100%)	57[b]	5,56	

[a] Use categories were ranked in accordance of importance based on mean CI values.

[b] As some species are cited in more than one use categories, these numbers (40 and 57) indicating the number of species recorded in Turkey and in Georgia are lower than the total of number of species recorded for each medicinal use category.

Table 5 shows the number of use-reports, number of species, cultural importance, and informant consensus for each medicinal use-categories. A detailed comparison of the results in Table 5 reveals that ailments related to digestive and respiratory systems have the highest number of use-reports (in total, 44% of URs) in Georgia, whereas digestive and skin have the highest URs (in total, 48% of URs) in Turkey. In order of importance, these categories are followed respectively by cardiovascular and skin disorders in Georgia, and respiratory and endocrine system disorders in Turkey. Conversely, complaints related to blood, eye, neurological and psychological conditions have the least (or not any) use-reports in both countries. On the other hand, the informant consensus factor (FIC) in each top three medicinal use categories are, in order of importance, respiratory, digestive, genitourinary in Georgia, but digestive, skin and cardiovascular in Turkey. There is no statistical consensus in the blood category in both countries; neither is there any consensus in the genitourinary category in Turkey. However, it is noted that low (e.g. in mu-sk, blood, eye and neuro) or exceptionally high (e.g. in psych) FIC values in this table can be misleading since they were represented by very low use reports and with species less than three use-reports, it should not be interpreted as a high degree of intracultural variation but it might be a sign of insufficient documentation of participants' knowledge [57].

To summarise, in the case of wild woody plants, the most commonly cited and valued medicinal knowledge/use with high agreement among participants dealt with the treatment of digestive disorders in both countries. This use category also had the highest wild woody plant richness in both countries, a result possibly pointing to the fact that communities living in the study area tend to suffer from digestive problems.

Digestive system

The most widely used traditional cures for digestive complaints differ in both countries. In Georgia, the genus with highest cultural importance in this category is *Quercus* sp. (CI_s 0.24), (only represented by *Quercus petraea* subsp. *iberica)*, whereas in Turkey, *Picea orientalis* has the highest CI_s (0.28) for digestive problems. URs for *Quercus petraea* in Georgia stem from toothache and tooth inflammation (both 10.2% of digestive URs), stomach ache (3.4%) and diarrhea (3.4%), whereas in Turkey *Picea orientalis* is used mainly for stomach ache (29.3% of digestive UR). Among the applications, gargling a water decoction of the outer bark of *Quercus petraea* is commonly known for treating toothache in Georgia. A similar use was also reported in Georgian sources [Kopaliani, Mindadze cited in 93]. On the other hand, a participant from Turkey described inhalation of vapor of water-decocted roots of *Cornus mas* for toothache treatment, a previously unrecorded use in the Caucasus literature (See Table 2).

In the study area, fresh resin of *Picea orientalis* was found to be commonly used as chewing gum or swallowed for stomach ache both in Georgia and in Turkey. Although the use of *Picea* resin for digestive system disorders was mainly reported as a cure for ulcers in both Turkey and Georgia [87, 90, 88,12], it had only been mentioned as a cure for stomach ache in a single study in the cited literature [88].

With a CI of 0.19 in Turkey, *Berberis vulgaris* is another important species for digestive problems (24.1% of digestive URs); its corresponding CI is 0.18 (13.6% of digestive UR) in Georgia. Jaundice is the only illness mentioned for its use in Turkey. Participants frequently called it "*sarılık ağacı"* which literally means "the tree of yellowness" in Turkish. Similarly, it was frequently said to cure jaundice and liver associated diseases in Georgia. Drinking of or/and bathing in a water decoction of *Berberis vulgaris* branches (and roots in Georgia) are the common mode of applications for jaundice in both countries. Using roots, bark and also fruits had been previously noted for treatment of jaundice in Georgia [Lapachi, Tsutsunava cited in 94]. An infusion of the fruit in salty water had been reported to cure jaundice in Azerbaijan [Alalbarov, Damirov cited in 94]. Similar/Identical medicinal knowledge was reported close to the current study area only in the Turkish province of Erzurum. Bathing and drinking a water decoction of *Berberis vulgaris* root, and licking the root of *Berberis vulgaris x crateagina* for curing jaundice in this province were mentioned in several studies [20,79,77,78].

Respiratory system

In accordance with measures of cultural importance (CI), diseases related to the respiratory system are the second most important medicinal category in Georgia (CI 1.13), while it is the third in Turkey (CI 0.32). The genus with the highest cultural importance for respiratory diseases is *Pinus* (CI_g 0.4) in Georgia, represented only by a single species, *Pinus sylvestris* var. *hamata*. In contrast in Turkey, *Rosa* spp. (CI_g 0.18) are widely used, with *Rosa spinosissima* (CI_s 0.09) representing half of this value.

The most common respiratory ailments in Georgia are lung diseases (29.4% of respiratory URs), cough (21.6%), and bronchitis (17.6%). Water infusions of young seed cones and pollen cones, or a mixture of both plant parts of *Pinus slyvestris* var. *hamata* (syn: *Pinus kochiana* or *Pinus sosnowskyi*) are widely known tea remedies for treating common respiratory diseases. Mainly pollen, as well as cone have been reported for these disorders and for asthma, from different parts of Georgia [12,13,15]. On the other hand, a decoction of the needles for cough was reported in Azerbaijan [Alekperov, Alalbarov, Damirov cited in 95]. However, in Turkey, only the infusion of young seed cones were reported for cough and asthma with a UR value of 2. Another treatment reported only in Georgia, to be good for asthma, bronchitis and lung diseases is a jam made of young seed cones and pollen cones and also pollen cones mixed with honey.

Cough (29.2% of the respiratory URs), asthma (20.8%) and influenza (16.7%) are the most commonly mentioned diseases in Turkey. A water decoction of *Rosa spinosissima* root, mainly for cough and bronchitis, is the most mentioned remedy in Turkey. Furthermore, a water decoction of its fruits was given for cough which had also been reported from Turkey before [84]. Water decoctions of roots were also mentioned to cure influenza, which has also been reported in this and other studies [23,76]. Interestingly, for Georgia and other neighboring countries, no use-reports were found to be specified for *Rosa spinosissima* (syn. *Rosa pimpinellifolia*) for these respiratory disorders.

The diversity of plants with only a single use-report mentioned for treatment of asthma in Turkey is noteworthy. The fruits of *Crataegus orientalis*, *Sorbus aucaparia* and *Juniperus communis*, young seed cones of *Pinus sylvestris* and leaves of *Viscum album* were reported to cure asthma in Turkey. The variety in plants used for asthma could be the reason for the relatively low consensus FIC in the respiratory category in Turkey (0.52) when compared to Georgia (0.70). Drinking water decoctions of the roots of *Rosa spinosissima* and *Rosa boissieri* are mentioned to be good for shortness of breath in Turkey. Based on participants' statements, this emic category was separated from asthma. Among the above mentioned species, *Crataegus orientalis* and *Pinus sylvestris* were also given for asthma in the literature [78,14]. The use of *Viscum album* for asthma has also been reported by several other studies from Turkey [90,88,89].

Cardiovascular system

The third most important medicinal use category in Georgia (CI 0.71) is for cardiovascular conditions whereas in Turkey, its position is fifth with CI value of 0.23. Hemorrhoids (including its itching symptoms) are the most widely mentioned complaint among the participants in Turkey (16 UR, 94.1% of the cardiovascular URs). In contrast, in Georgia it is only mentioned five times comprising 15.6% of their URs. Here, heart-related healthy applications and

complaints are the major reports (53.1% of cardiovascular URs). *Crataegus* spp. have notable importance (11 UR) for heart health and heart related complaints in Georgia, where the fruits of these species are eaten fresh, consumed as compote or drunk as tea. Several studies from Georgia [12,16,96] and relevant sources from Azerbaijan and Armenia [see 96] also mention similar use-reports of fruits, flowers or leaves of *Crataegus* spp. (especially Crataegus *pentagyna* and *Crataegus monogyna*). In Turkey, *Rosa* spp., in particular, *Rosa canina* (4 UR) and *Rosa spinosissima* (7 UR) are the most important species used against hemorrhoids. Fruits of *R. canina* and roots of *R. spinosissima* (occasionally their fruits) are widely known/used for hemorrhoids by participants in Turkey. A review related to plants used to treat hemorrhoids identified *Rosa canina* as most frequently used species in Turkey, while *Rosa spinosissima* (syn. *R. pimpinellifolia*) was mentioned in only one study conducted in Erzurum in 1999-2000 [77] in which only fruits, not roots were reported to be used [97]. Later research did report the use of roots [79] and several other studies mentioned the use of fruits [84,86]. The use of fruits and/or roots together to treat hemorrhoids was also reported as well [78]. However, in this particular fieldwork in Georgia, among *Rosa* spp., only *Rosa canina* (2 UR) was mentioned for hemorrhoids, with no consensus on any species out of four species reported for hemorrhoids in Georgia. Furthermore, neither *R. spinosissima* nor *R. canina* was mentioned for hemorrhoids in the sources from Georgia, Azerbaijan or Armenia [98].

Skin

As stated previously, skin ailments are the second most important category in Turkey (CI 0.39) comprising 16.0% of URs, while being the fourth category in Georgia (CI 0.53), with 9.6% of the URs. Informant consensus factor on skin complaints in Turkey (FIC 0.68) is also relatively higher than that in Georgia (FIC 0.35) (Table 5). The majority (52% of the skin URs) of skin problems mentioned by participants in Turkey are wounds (mainly cuts and inflammation). *Picea orientalis* is the most important plant for wound healing, having 13 out of 17 skin category use reports in Turkey. After stomach ache, this is the second most important use of this species. It is also mentioned for the treatment of burns, bruises, boils and as an antiseptic in Turkey. Macerated resin of *Picea orientalis,* locally called "*pisi*", is applied as a plaster for any kind of wound, a widely known application in Turkey. One unique report describes using it in a homemade wound healing salve, a mixture of *Picea* resin, beeswax, butter and olive oil. Similarly, "*pisi*" is frequently (29.2% of skin use reports) mentioned for wounds and boils in Georgia. Such healing properties of *Picea orientalis* are also consistent with applications mentioned in several sources from Turkey [80,81,87,88,90] and one source from Georgia [14]. On the other hand, *Rubus idaeus*, *Rubus caucasicus* and *Vaccinium archostaphylos* are the only species claimed to treat eczema by a participant from Georgia. A water decoction of either *Rubus* leaves or the young branches *of Vaccinium archostaphylos* with leaves were stated to treat eczema. Among literature references, the only report similar to this usage (eczema) involved eating boiled roots of *Rubus caesius* [82].

Alnus glutinosa and *Salix* spp. are used as ritual medicinal plants to cure warts in Turkey. With the former, as many *Alnus glutinosa* leaves as the number of warts are hung on the wall. It is thus believed that the warts will disappear when the leaves dry and fall to the ground. In the latter practice, people carve as many notches as the number of warts in a branch of *Salix* spp. and keep it over the roof of the house. The wart is predicted to disappear when the branch falls from the roof. Magic rituals with several wild plants (one includes *Alnus glutinosa*) against warts have also been reported in certain studies in Europe [99,70]. In contrast, in Georgia, the only application reported to cure warts involved the use of a jelly of fruits of *Viscum album* as a plaster on the warts. On the other hand, the external use of root gum of *Astracantha microcephala* was reported for warts in Erzurum in Turkey [86]. Also, the ash of *Viburnum lantana* stem was reported for the same purpose in Çıldır, Ardahan, which was not mentioned during this study [23].

Endocrine system

Endocrine complaints are among the top five medicinal use categories in both Georgia (CI 0.47) and Turkey (CI 0.27). Diabetes (20 UR) is the only disease mentioned in Turkey whereas in Georgia it has 17 UR (81% of the endocrine URs). Gout and thyroid are the other ailments reported in Georgia. *Vaccinium mrytillus*, *Vaccinium arctostaphylos* and *Vaccinium uliginosum* (total 9 UR) are the most important species used for the treatment of diabetes in Georgia, while in Turkey, *Crataegus monogyna*, *Crataegus azarolus*, *Crataegus pentagyna* (total 5 UR) and *Sorbus aucaparia* (5 UR) are the most important species. Water infusion of young branches of both *Vaccinium* spp. with leaves is a widespread application employed for the treatment of diabetes by participants in Georgia, with one report of the eating of their fresh fruits. The same details, especially for *Vaccinium arctostaphylos,* were also mentioned in several studies from Georgia only [12,16,17,25]. Similarly, although less commonly reported (2 UR), *Vaccinium mrytillus* was mentioned in the same ways in Turkey, with fruits or/and leaves of *Vaccinium mrytillus* having been reported for diabetes around the study area, and in general in the Eastern Black Sea Region of Turkey [82,80,21,81]. Moreover, the eating of fresh ripe fruits of *Crataegus* spp. (5 UR) and *Sorbus aucuparia* (5 UR) were recorded as the common treatment for

diabetes in Turkey and, although uncommon (1 UR), the same approach in Georgia. The utilization of *Sorbus aucuparia* against diabetes has not been previously reported in/around this particular study region either in Turkey or in Georgia although its antidiabetic uses were reported in several sources [Armenian and Azerbaijanian sources cited in 100]. Similarly, Crataegus spp. (*Crataegus azarolus* var. *pontica*, *Crataegus monogyna*, *Crataegus pentagyna*) have not been mentioned as antidiabetic in the cited references (See Table 3).

General health and unspecified illnesses

The use of shrubs and trees as preventive medicine for general health has CI 0.53, 9.6% of the total medicinal use reports in Georgia, while in Turkey (CI 0.11) this constitutes 4.4% of the medicinal use reports. A cure-all (panacea) and using plants against vitamin deficiency are the most common emic categories in both countries. *Rosa, Ribes, Satureja* and *Taxus* species were mentioned in Georgia, while *Rosa, Vaccinium, Rhododendron* and *Padus* species were mentioned in Turkey. On the other hand, regarding uncategorized illnesses, *Ribes* spp. were frequently mentioned against fever, a use not previously specified in the literature. Moreover, *Picea, Pinus* and *Abies* species were mentioned by participants for use against tuberculosis in Georgia. Others have previously reported these species for the treatment of tuberculosis in Georgia [12,16], while a similar record was made for *Picea orientalis* in Turkey [87] and for *Pyrus communis* in Georgia [Kopaliani, cited in 18].

Genitourinary system

In this study, genitourinary disorders were more commonly mentioned (23 UR) in Georgia (CI 0.51) than in Turkey (8 UR, CI 0.11). The majority of the use reports (60.9%) in Georgia concern the kidneys (kidney stones, pains, diseases), while female (vaginal discharge, abortion, infertility) and male (prostate) genital conditions were proportionally more reported (%75 of URs) in Turkey than in Georgia. *Rosa* spp. were most frequently mentioned (11 UR) for kidney related problems in Georgia. Water infusions or decoctions of *Rosa* fruits are the most common remedy for kidney related problems in Georgia, whereas in Turkey water decoction of *Rosa* spp. were mentioned to be good for the prostate. An unusual report mentioned in Turkey was about *Viscum album*. One of our participants in Artvin described drinking a water infusion of the aerial part of *Viscum album* as a self-induced abortion method. In fact, although quite rarely cited, this species has been reported to produce abortion or miscarriage in goats during the kid season [Barker, cited in 101]. Not surprisingly, it was also reported to be risky for pregnant women for its uterine stimulant effect [102].

In summary, the seven medicinal use categories mentioned above are represented by 15 woody plant species having at least four UR in one of these categories in the study area. They are ranked in accordance with the number of mean UR for each use category in Table 6 . Moreover, based on CI index value, 60% of the top 20 genera in both countries have use reports for at least three medicinal use categories. Therefore, the diversity of usage makes these species and genera of top priority for our participants' health, well beings and cultures.

Table 6 The most salient species with more than 3 UR for at least one use category in the study area.

Latin name	UR Georgia	UR Turkey
Digestive		
Picea orientalis (L.) Peterm.	8	21
Berberis vulgaris L.	8	14
Quercus petraea subsp. *iberica* (Steven ex M.Bieb.) Krassiln	11	-
Pinus sylvestris var. *hamata* Steven	3	3
Sambucus nigra L.	5	1
Betula pendula Roth.	3	1
Rosa spinosissima L.	-	4
Respiratory		
Pinus sylvestris var. *hamata* Steven	18	2
Picea orientalis (L.) Peterm.	9	1
Rosa spinosissima L.	-	7
Tilia rubra subsp. *caucasica* (Rupr.) V.Engl.	2	3
Ribes uva-crispa L.	4	-
Cardiovascular		
Rosa spinosissima L.	2	7
Rosa canina L.	2	4
Crataegus monogyna Jacq.	4	-
Skin		
Picea orientalis (L.) Peterm.	8	17
Endocrine		
Vaccinium myrtillus L.	6	2
Sorbus aucaparia L.	1	5
Vaccinium arctostaphylos L.	4	-
General health and Unspecified		
Ribes petraeum Wulfen	5	-
Rosa spinosissima L.	2	2
Genitourinary		
Rosa canina L.	9	-
Muscle and skeletal	1	3
Picea orientalis (L.) Peterm.		

Other medicinal use-categories

The categories with the fewest use reports (URs) in Georgia are muscle and skeletal (8 UR), eye (3 UR), blood (2 UR), neurological (1 UR) and psychological (2 UR). Similar categories have the fewest reports in Turkey, namely muscle-skeletal (7 UR), blood (5 UR), neurological (4 UR) and eye (1 UR).

Regarding muscle and skeletal disorders, two noteworthy remedies were mentioned by participants in Georgia for *Prunus cerasifera* against bone and joint pains, and back pains. In the former, a mixture of fruits with honey is used as a plaster, while in the latter the plaster is made of vodka infused fruits with salt. In a similar way, a mixture of *Prunus cerasifera* fruits with honey was mentioned for curing sprains in Turkey. As far as it is known, external use of *Prunus cerasifera* (syn. *P. divaricata*) for muscle and skeletal disorders has not previously been reported in Turkey or in Georgia.

Considering blood related problems, two species were given in Georgia, *Cornus mas* for anemia and *Rosa canina* for cleansing the blood. *Cornus mas* has also been reported in one Georgian source [Kopaliani, cited in 98]. On the other hand, five species were named in Turkey, two species for anemia (*Rosa spinosissima* and *Prunus avium)*, one for blood cleansing (*Rosa canina*) and two for iron deficiency (*Prunus laurocerasus* and *Vaccinium myrtillus*). A report of enhanced blood production of *Vaccinium myrtillus* has also been mentioned in Turkey [87].

For eye conditions, a drinking water infusion of *Vaccinium myrtillus* leaves and the eating of its fresh fruits were mentioned to be good for sight in Georgia. These remedies have also been reported from Georgia [25] and from Turkey [81]. External application of a water infusion of *Salix capraea* flower was claimed

to cure eye diseases in Georgia. On the other hand, in Turkey, a drinking water decoction of *Crataegus rhipidophylla* fruits was mentioned only once for eye diseases.

As for neurological disorders, three species were mentioned in Turkey: *Juglans regia, Rosa spinosissima* and *Prunus laurocerasus* for headaches; and *Rosa spinosissima* for dizziness. Whereas in Georgia, a drinking water infusion of *Ostrya carpinifolia* flowers was described to cure headache by one participant in Georgia. Two previous unique reports from the Eastern Black Sea Region of Turkey also mention the external use of fresh *Rhododendron ponticum* leaves for headache [80,89]. For psychological complaints, drinking water infusions of *Tilia rubra* subsp. *caucasica* flowers was mentioned to be relaxing in Georgia.

Diversity of uses

The 20 genera/species with highest CI and their relative importance in each medicinal use-category are shown in Figure 6 , 7. It seems that the culturally most important species are also the most versatile species in terms of number of different uses. However there are some exceptions. For instance, *Berberis vulgaris* ranks third in CI index in Turkey but has reports in two medicinal use-categories. In addition, *Prunus* spp. and *Rubus* spp. in Georgia have several uses but ranked below less versatile genera such as *Berberis, Quercus* and *Crateagus*. These exceptions become more visible when the rankings of CI with Use diversity value (UD) (Figure 8.) are compared.

Among culturally most important 5 genera/species, only *Rosa* spp. and *Pinus* sp. in Turkey and *Vaccinium* spp. in Georgia save their place or ranked among the top in UD ranking. The differences in the rankings seem to be related to divergent use contributions of culturally important species to each use category. That means use reports of genera/species are not evenly distributed in medicinal use categories. Several genera/species such as *Prunus* spp. and *Rubus* spp. in Georgia or *Prunus* spp. *Vaccinium* spp., *Rhdodendron* spp. and *Junglas* sp. in Turkey ranked in high positions based on UD values. Number of different uses as well as their relatively even contributions to medicinal-use categories affected these results. However, interpreting these results as a means of importance of the genera/species would be misleading as the species have very few use reports in each use categories.

Conclusions

The results of this study indicate that, due to combinations of high plant diversity, multicultural and multi-linguistic nature of the study area, the richness of traditional plant wisdom, unique knowledge and depth of botanical understanding of people are reflected in the number of plant species they know, with their diverse folk plant names as well as methods of harvesting, preparing and using these plants. Thus, this study area still maintains clear medicinal knowledge and practices regarding wild woody plants. Indeed, more than half of the distinct ethnomedicinal usage of wild woody plants documented in this study have not been reported in the Caucasus literature before. The majority of this plant knowledge is still present, partly in use or at least harbored in memories. However, especially in Turkey, many of the reported uses are no longer implemented in practice, only remaining in the memory of elders who still maintain their traditional agro-pastoral transhumant lifestyles.

What is striking is the fact that, despite environmental and floral similarity, common historical/cultural contact, and similar livelihood strategies, the number of same wild woody plant species stated/utilized as medicinal between studied communities on both sides of the Georgia-Turkey border is quite low. The species with similar/identical use are *Sambucus nigra, Berberis vulgaris, Picea orientalis*, *Pinus sylvestris var. hamata*, *Vaccinium arctostaphylos*, *Vaccinium myrtillus*, *Tilia rubra subsp. caucasica*, *Crataegus monogyna*, *Rosa canina*, *Rosa hirtissima and Sorbus aucaparia*. Moreover, marked differences in the content (purpose of use) of the knowledge regarding medicinal use of these plants were found. At the present time, shared ethnomedicinal knowledge/use across the border is unexpectedly low, forming less than 10% of the reported ethnomedicinal use incidences.

These differences are particularly noteworthy between transhumant communities across the border. It seems that patterns of medicinal knowledge are connected with numerous/multiple cultural factors, in particular ethnolinguistic diversity, cultural background, and access to multilingual written folk and scientific literature. Due to its dynamic complex nature, while a generalized definite conclusion cannot be drawn, access to multilingual literary sources seems to be one of the most relevant driving forces to account for the medical knowledge patterns in the study area. To better understand the underlying factors and driving reasons for the shared and separate plant knowledge among different communities on both sides of this international border, future studies should consider cultural diversity (language, ethnicity), socio-economic conditions as well as the political histories of each community. Restricting the comparison unit to a single plant genus, with structured questions may provide a more rigorous approach to the evaluation of patterns and dynamics of ethnobotanical knowledge. Most importantly, to identify factors that shape medicinal plant knowledge in such a multicultural area, strong collaboration between local people, botanists, ethnologists, ecologists, pharmacologists, linguists, anthropologists and sociologists is essential for future research in the field of ethnobotany.

A number of practical implications related to medicinal wild woody plants have emerged from this study. Firstly, unique and shared plant species and their use knowledge documented in this study could encourage further phyto-pharmaceutical research for the development of natural botanical-based

pharmaceuticals and phytotherapy practices. It is hoped that these will contribute to the health, well-being and livelihood of these communities, in the Caucasus and worldwide. Secondly, Georgia's National Biodiversity Strategy and Action Plan (2014–2020) has a recommendation for restoring traditional knowledge of local peoples related to biodiversity conservation and sustainable resource use, to be integrated into their legislation and national strategies by 2020 [103]. In Turkey, a recent Project of the Ministry of Forestry and Water Affairs has also taken a valuable step towards documenting biodiversity-based traditional knowledge [104]. As the links between traditional knowledge and the conservation of biodiversity receive increasing attention from the scientific community worldwide, ethnobotanical knowledge and practices related to woody plant resources in mountainous regions along the Georgia-Turkey border might contribute to future cross-border action plans and policies for plant conservation and management of vegetation resources. It is hoped this will add value to the development of functional models for biocultural diversity conservation, restoration and sustainable uses of natural resources in the Caucasus.

Abbreviations

UR: Use-report, FIC: Informant Consensus Factor, CI: Cultural Importance, UD: Use Diversity Value

ICPC: Index International Classification of Primary Care

Declarations

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.

Consent for publication

Not applicable

Availability of data and materials

All data generated or analysed during this study are included in this published article.

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 fieldworks 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 all the tables, graphs 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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Figures

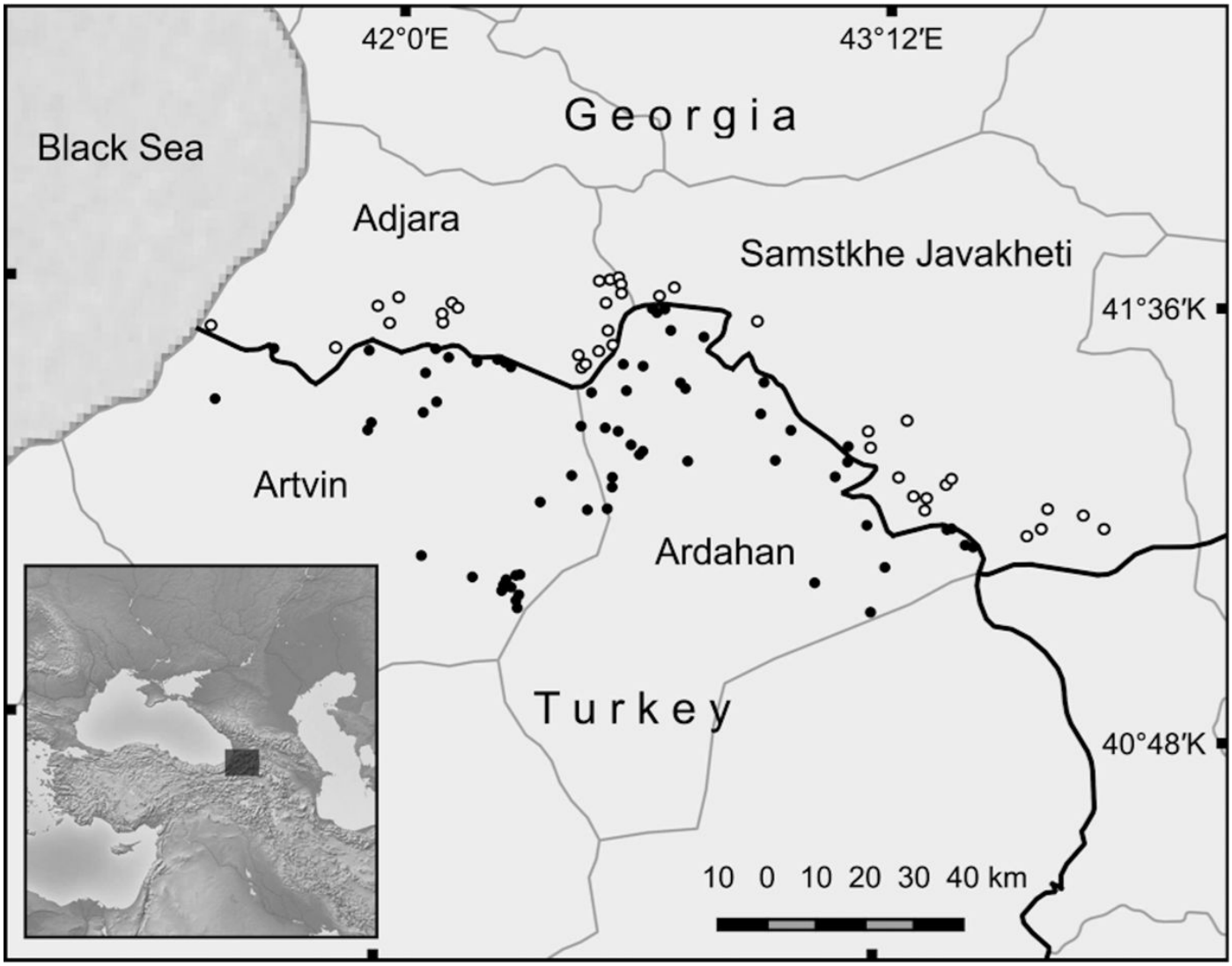


Figure 1

Map of the study area: Distribution of visited highland pastures and villages. Black dots correspond to places in Turkey; white dots refer to places in Georgia.

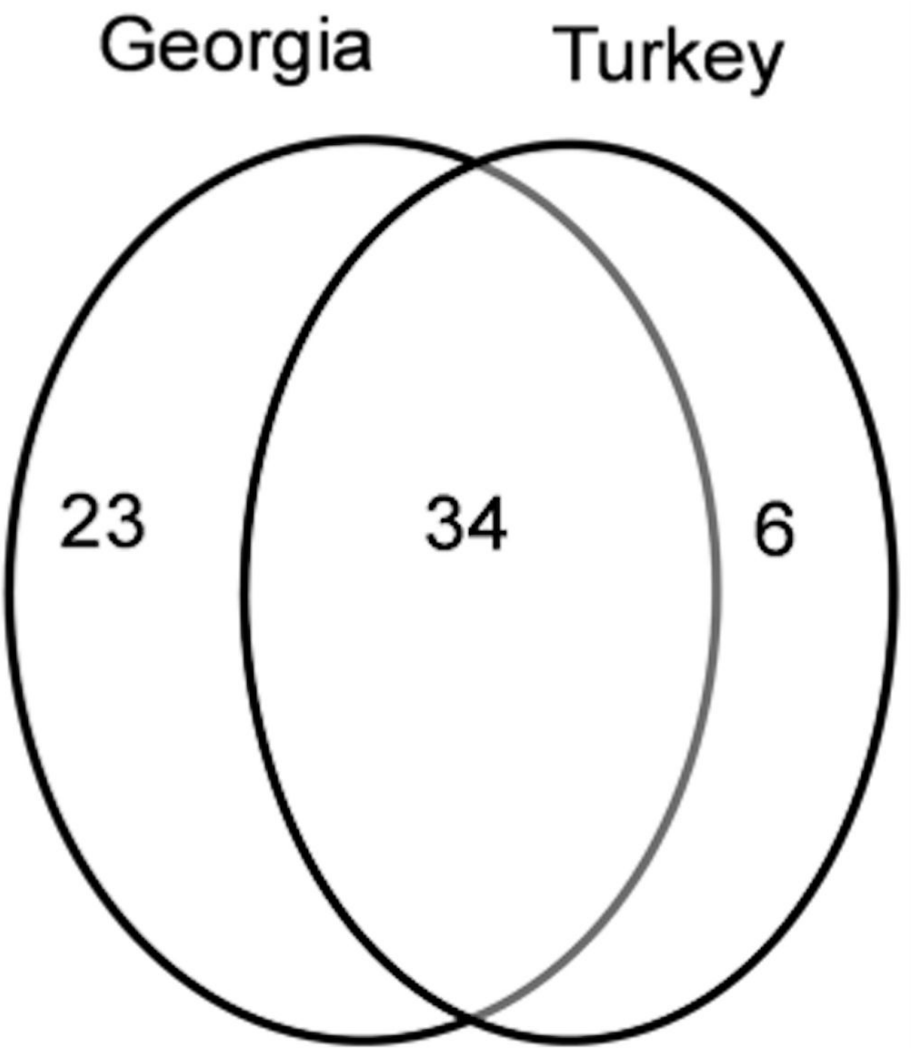


Figure 2

Overlaps between the recorded numbers of wild woody plant species among studied communities. *Note that the studied sites in Turkey include highland settlements of Artvin and Ardahan; the studied sites in Georgia include highland settlements of Adjara and Samtshke-Javakheti around the border.

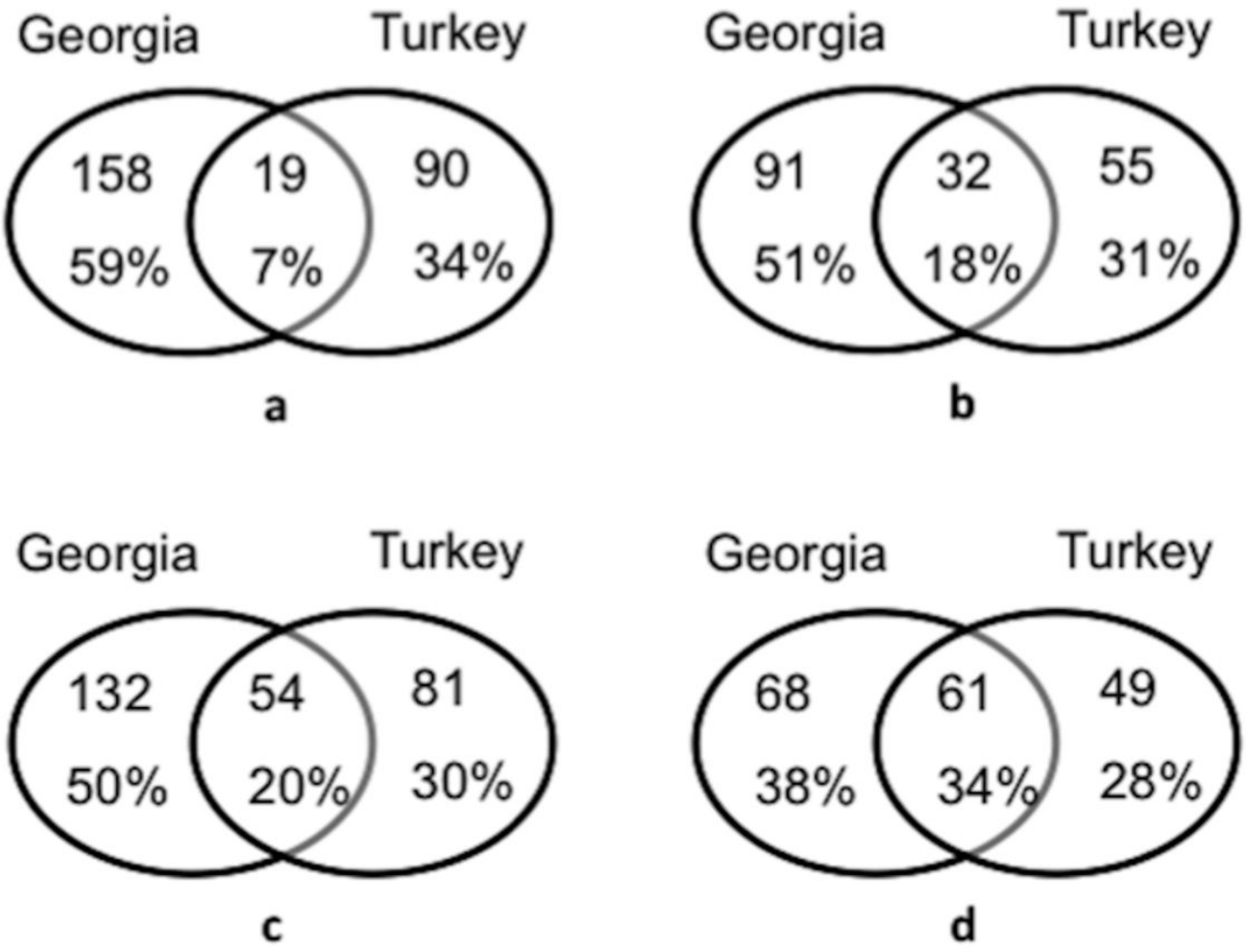


Figure 3

Overlap of species-use combinations. a) and b) are based on only this research data, comparing the emic/folk use category and medicinal use category respectively. c) and d) are based on this research data and literature data in the Caucasus Ecoregion, comparing the emic/folk use category and medicinal use category respectively.

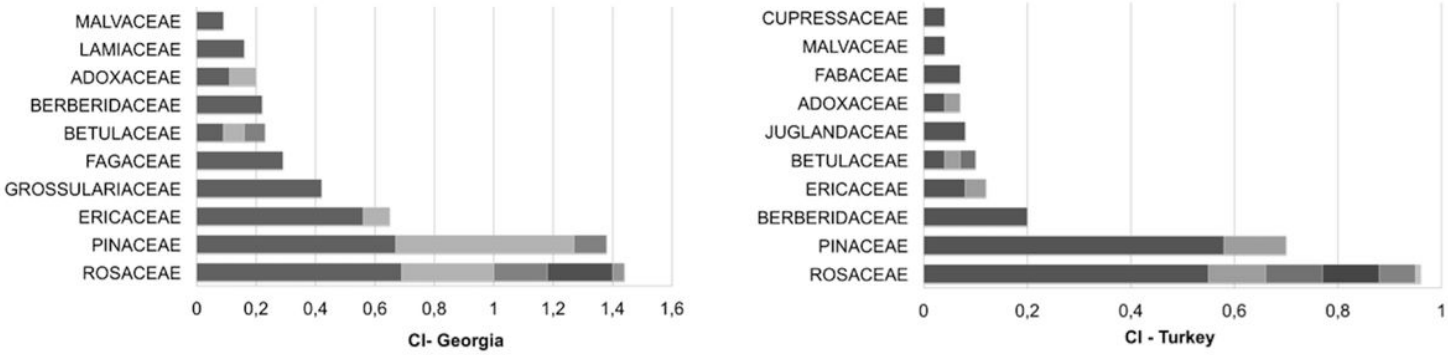


Figure 4

Cultural importance (CI) index of the 10 most important families in Georgia (left) and in Turkey (right). Each grey tones reflects the contribution of different genus to the total CI.

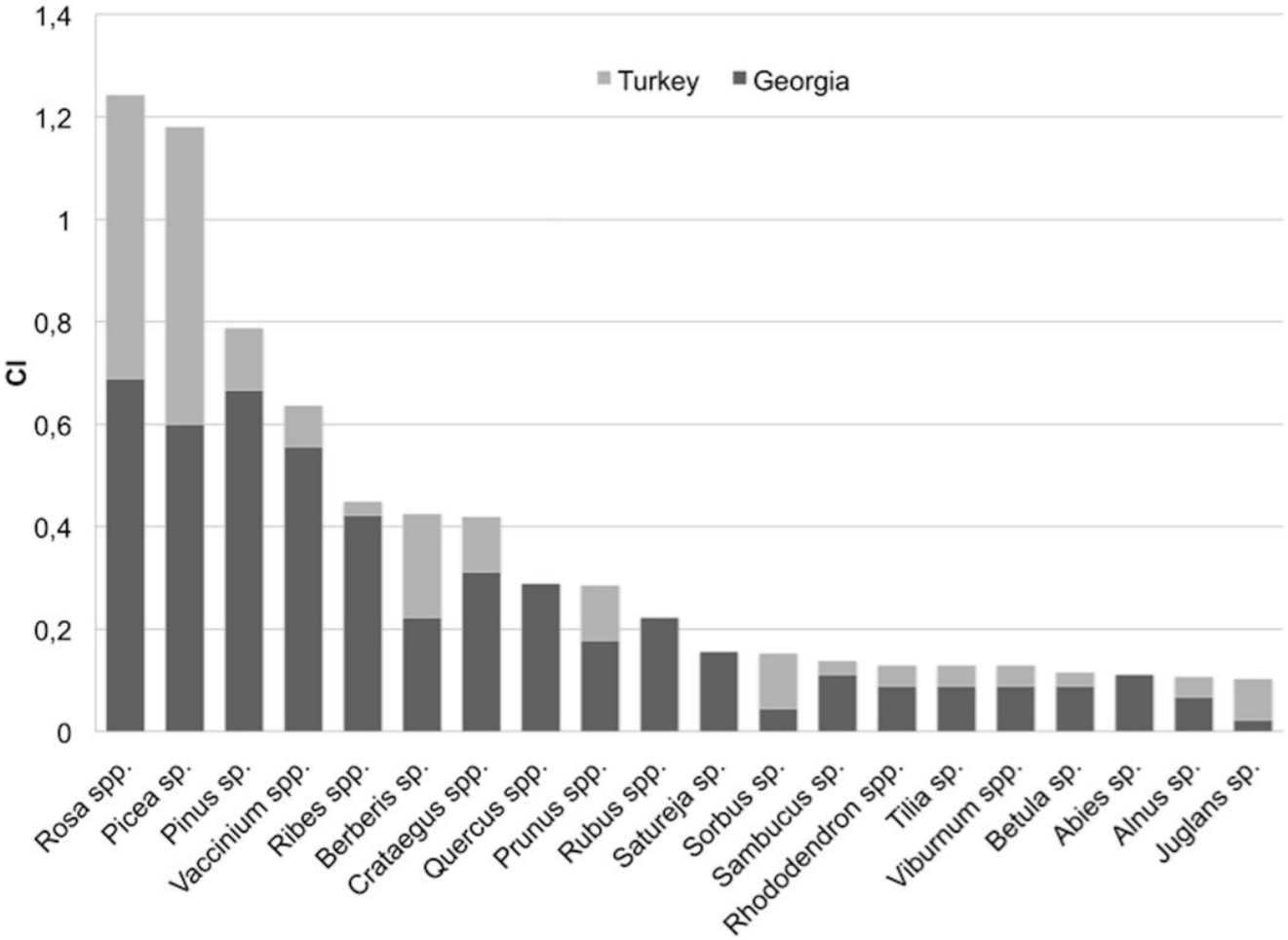


Figure 5

Cultural importance (CI) index of the 20 most important genera in the study area. (spp. indicates the contribution of more than one species, while sp. indicates the contribution of only one species)

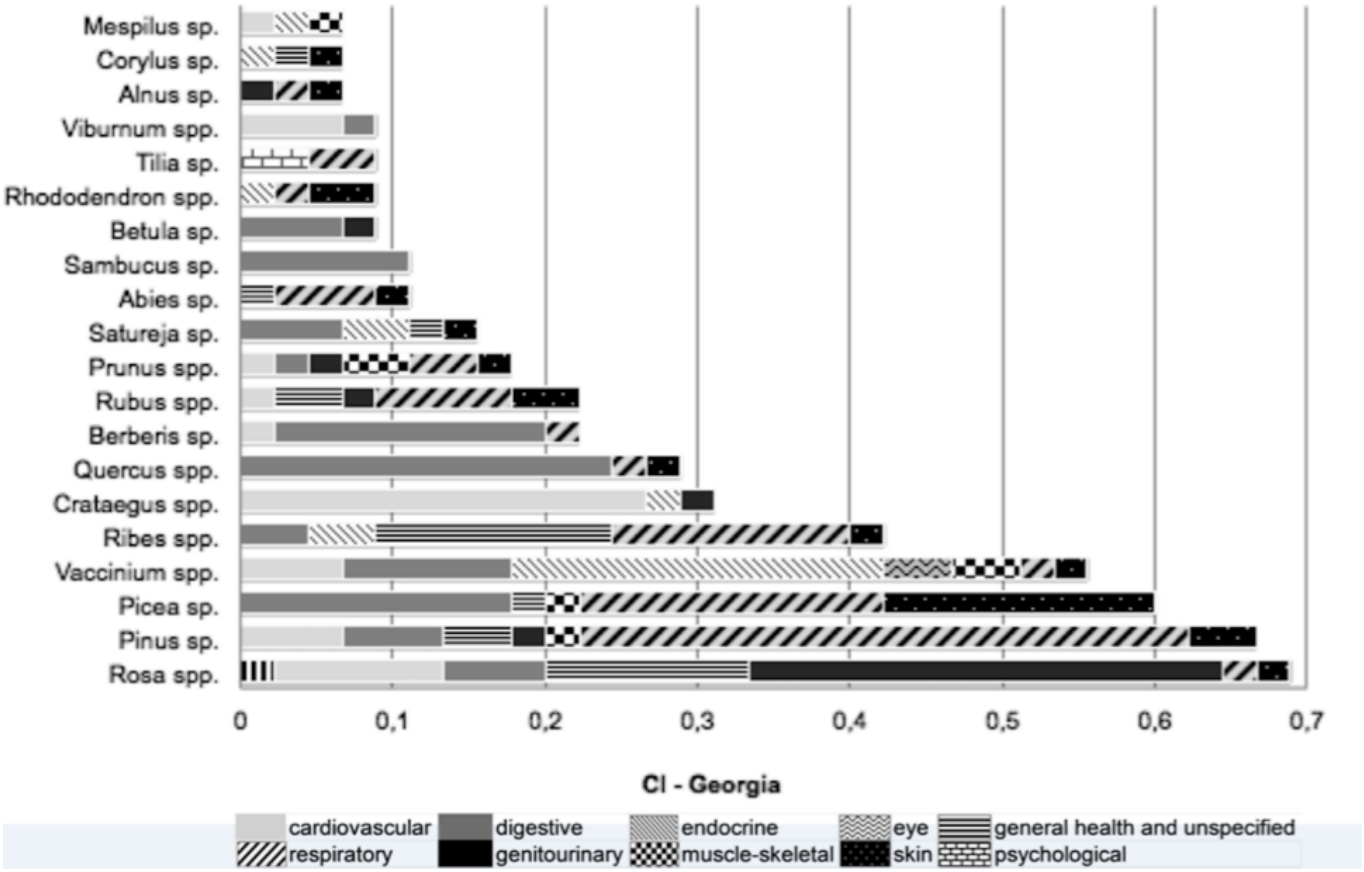


Figure 6

Cultural Importance (CI) index of top 20 genera in Georgia and their contribution to medicinal use categories. (spp. indicates contribution of more than one species, while sp. indicates the contribution of only one species)

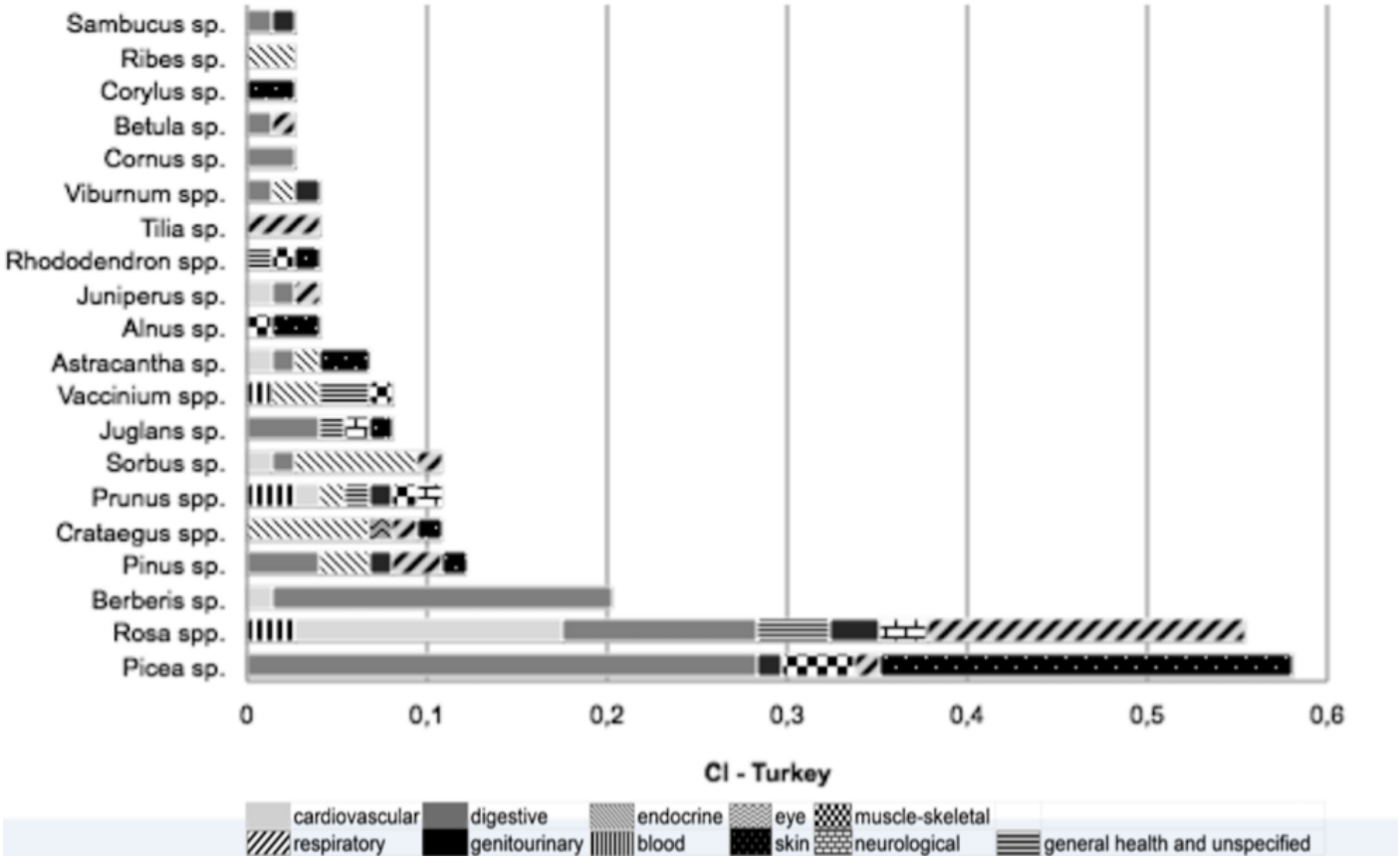
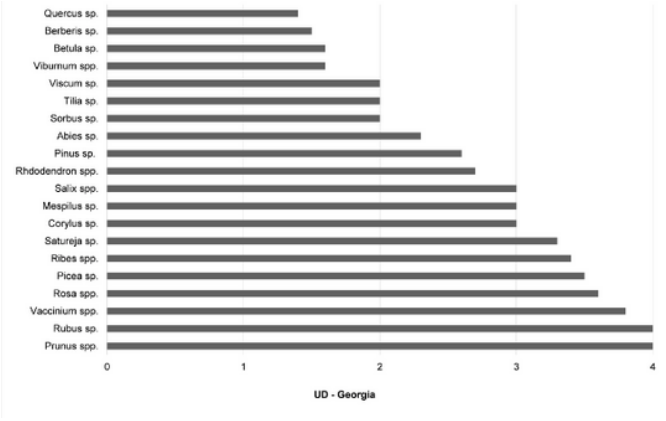


Figure 7

Cultural Importance (CI) index of top 20 genera in Turkey and their contribution to medicinal use categories. (spp. indicates contribution of more than one species, while sp. indicates the contribution of only one species)



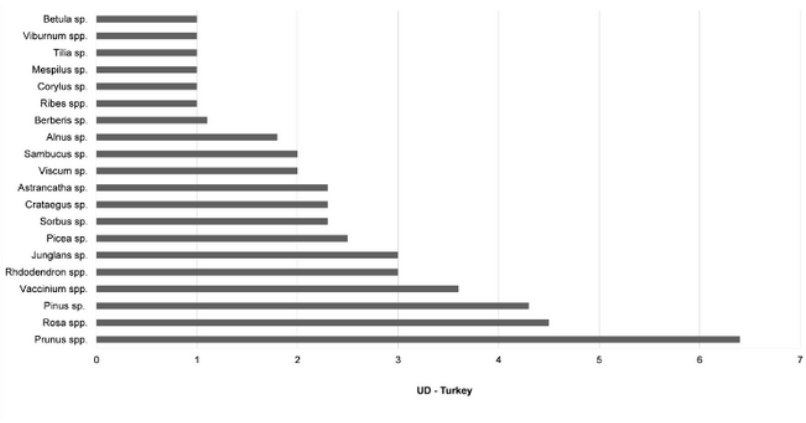


Figure 8

Use diversity (UD) value of top 20 genera in both countries.