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Authors' Contributions

CK and SO designed the study, organized and conducted all the fieldwork, and wrote all sections of the manuscript; CK 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; MM partially participated in the fieldwork in Georgia, provided advice and revisions during plant identification, and during preparation of the manuscript; ŁŁ contributed to the discussion section

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Competing Interests



ŁŁ is an associate editor of *Acta Societatis Botanicorum Poloniae*; other authors: no competing interests have been declared

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ORIGINAL RESEARCH PAPER in ETHNOBOTANY

Wild Plants Used as Vegetables by Transhumant People Around the Georgia–Turkey Border in the Western Lesser Caucasus

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Abstract

Recent ethnobotanical studies in the Caucasus, mainly in Georgia, reveal the significant ethnobotanical knowledge of local people related to wild edible plants. However, few studies have been conducted in the Lesser Caucasus, west Georgia, and Turkish Caucasus. This study aims to represent and evaluate the cultural importance of wild vegetable plants and their patterns of use along the Georgia–Turkey border. During the transhumance period in the summers of 2017 and 2018, 104 participants (65 in Turkey and 39 in Georgia) were interviewed using a semistructured questionnaire. The Cultural Importance Index and Relative Frequency of Citation were used to compare the relative importance of species in each region. The use of 83 wild plant species from 23 plant families as vegetables was documented, with 45 species recorded in Georgia and 72 species in Turkey. One-third of the recorded wild plant species and 52 use instances out of 122 species-use combinations were shared on both sides of the border. Women and men had mentioned almost the same number of species, and there was a nonsignificant correlation between the plant knowledge and age. Although there were no significant differences in the plant parts used, the way people used plants as vegetables varied significantly across the border. Considering the floral similarity across the border, the number of species used in common and shared vegetable plant knowledge was quite low. There is not a significant difference between the two countries in terms of the most frequently cited and culturally important species (*Rumex*, *Urtica*, and *Polygonum* spp.). However, the recognition of some of the most important shared species (*Heraclium*, *Chaerophyllum*, *Arctium*, and *Campanula* spp.) diverged significantly in different administrative regions.

Keywords

wild vegetables; transhumant people; cross-border ethnobotany; Caucasus

1. Introduction

Human communities worldwide have collected and consumed many wild plants as food throughout history (Turner et al., 2011). However, with the decrease in gathering and use of these plants as a result of lifestyle changes, many observations, practices, and a significant amount of traditional knowledge related to wild edible plants is being forgotten (Łuczaj, 2010; Łuczaj et al., 2012; Menendez-Baceta et al., 2017; Turner & Turner, 2008). Concurrently, in industrialized societies, several plant species are being appreciated as healthy delicacies, and plant gathering traditions continue as a recreational activity (Łuczaj et al., 2012; Reyes-García et al., 2015;

Stryamets et al., 2015). Documenting the ethnobotany of edible plants and sustaining plant gathering traditions appears to be crucial not only for ensuring food security (Nolan & Pieroni, 2014; Quave & Pieroni, 2015) and for the nutritional potential and health benefits of the plants, but also to maintain cultural identities as well as to conserve biocultural heritage (Nebel et al., 2006; Reyes-García et al., 2015).

Wild vegetable plants are an important part of Mediterranean food culture (Łuczaj & Pieroni, 2016). Further, recent ethnobotanical studies in the South Caucasus, especially in Georgia, have also revealed people's significant ethnobotanical knowledge related to wild edible plants (Bussmann, 2017; Bussmann, Paniagua Zambrana, Sikharulidze, Kikvidze, Darchidze, et al., 2020; Bussmann et al., 2016, 2017a, 2017b, 2018; Bussmann, Paniagua Zambrana, Sikharulidze, Kikvidze, Kikodze, et al., 2020; Hovsepian et al., 2016; Łuczaj et al., 2017; Nanagulyan et al., 2020; Pieroni et al., 2020; Pieroni & Söukand, 2019; Söukand & Pieroni, 2019). This area of high cultural importance of wild vegetables forms a belt stretching from the Mediterranean, through Turkey (e.g., Çakır, 2017; Ertuğ, 2004; Hançer et al., 2020; Yeşil & İnal, 2019) up to the Middle East and the Caucasus. However, only a few studies have documented wild edible plants in the Lesser Caucasus, Western Georgia, and Turkish Caucasus (Akgül, 2007; Bussmann et al., 2017a; Güneş & Özhatay, 2011; Kadioğlu et al., 2020; Łuczaj et al., 2017; Özgen et al., 2004; Sağıroğlu et al., 2012; Saraç et al., 2013). In addition, there have been no cross-border ethnobotanical studies in this area earlier.

Therefore, in this study we aimed to: (i) document wild vegetables used among transhumant communities living on both sides of the Turkey–Georgia border; (ii) evaluate the cultural significance of plant species and their usage in different administrative regions; (iii) identify and discuss the similarities and differences in plant usage across the border; and (iv) compare the data with the ethnobotanical literature of the Caucasus ecoregion.

We tested the following null hypotheses: (i) the mean number of species used on both sides of the border does not differ significantly; (ii) the number of species used is positively correlated with the age of participants; and (iii) both genders have similar knowledge of wild vegetables.

2. Material and Methods

2.1. Area of Study

The geographical area covered in this study is located along the border between Georgia and Turkey in the Western Lesser Caucasus (Figure 1). This area corresponds to part of the highlands between the Hopa–Artvin–Ardahan–Çıldır main road in Turkey and Batumi–Khulo–Akhalsikhe–Ninotsminda main road in Georgia. It falls within the borders of the Adjara and Samtskhe-Javakheti regions in Georgia, and Artvin and Ardahan provinces in Turkey. The area includes the characteristics of three of the world's ecological regions: the Caucasus Mixed Forest Ecoregion, the Euxine Colchic Deciduous Forest Ecoregion, and, to a lesser extent, the Eastern Anatolian Montane Steppe Ecoregion (World Wildlife Fund, 2006). Its principal climate ranges from humid subtropical and mildly dry subtropical mountainous to continental climates. The annual average precipitation is approximately 2,200 mm in Adjara, 500–600 mm in Samtskhe-Javakheti, 700 mm in Artvin, and 900 mm in Ardahan. The minimum and maximum average temperatures are –3, +24 °C in Adjara; 0, +20 °C in Samtskhe-Javakheti; 2, +32 °C in Artvin; and –11, +16 °C in Ardahan. Dominant natural landscapes extend from forest and high mountain vegetation to Caucasian subalpine meadows and steppe meadows with freshwater lakes, mainly located along the Ardahan and the Samtskhe-Javakheti border (Williams et al., 2006) (Figure 2).

Between 1300 BCE and 580 ADE, the area fell within the old Georgian kingdoms of Colchis, Diauehi, and Iberia. The region witnessed various wars, migrations, and deportations and later became part of several kingdoms, empires, principalities, and countries. The variety of ethnolinguistic groups inhabiting the area includes Turks, Georgians, Armenians, Kurds, Azeris, Laz people, Hemshins, and Russians,

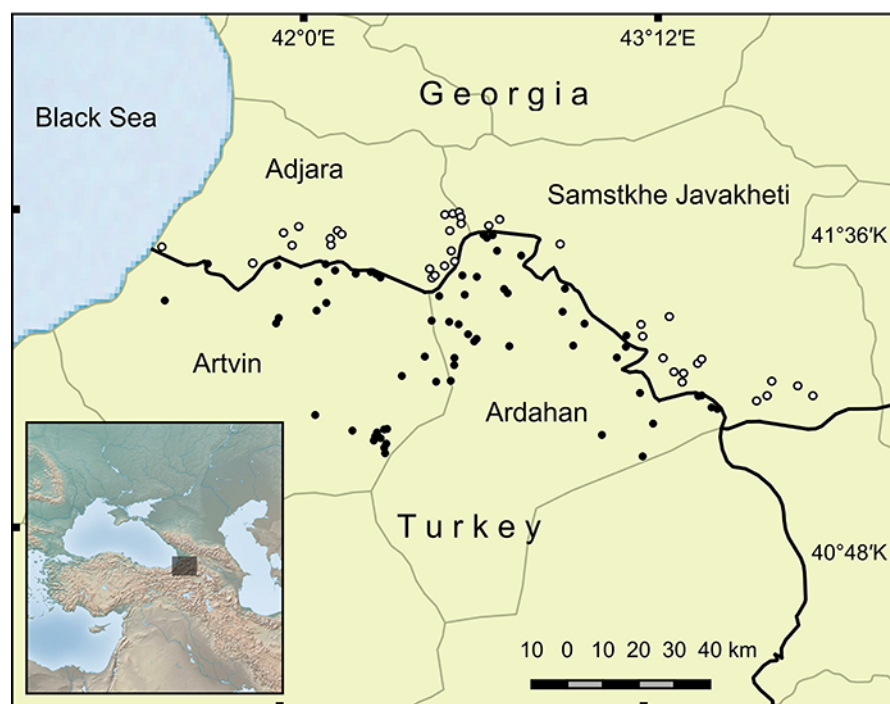


Figure 1 The study area: Distribution of surveyed highland pastures and villages; black dots correspond to locations in Turkey, white dots refer to locations in Georgia (map generated by Ceren Kazancı using QGIS).

with small-scale agriculture and relatively large-scale livestock farming as their main economic activities. Nearly all participants in this study were transhumant, maintaining an agropastoral 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 they live mainly in wooden houses for 3 to 5 months, with some people living in dry stone dwellings or even tents.

2.2. 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 1,600 m and 2,500 m within the study area using Google Earth. Subsequently, possible research locations were selected from among those settlements according to a number of geographical barriers (mountains, rivers, lakes, and passes) that would help identify a high diversity of floral and cultural characters. We attempted to reach people who had maintained their agropastoral transhumance lifestyle, as they 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, 2 weeks of nonsystematic preliminary fieldwork was conducted, and informal interviews were conducted in 20 highland pastures and villages in Georgia and Turkey (Oruç & Kazancı, 2018). Over the following two summers (2017–2018), field work was carried out for approximately 90 days during the period of transhumance (approximately June 15–September 15), which involved visits to 102 highland pastures, 65 in Turkey, and 37 in Georgia (Figure 1). During that period, 104 participants were interviewed: 65 in Turkey and 39 in Georgia. The mean ages of the participants were 57 and 58 years in Georgia and Turkey, respectively.

The presented results are part of a larger research project involving medicinal plants. The results that refer to the use of medicinal plants were gathered using the same methodology and often from the same respondents, and were published recently (Kazancı et al., 2020).

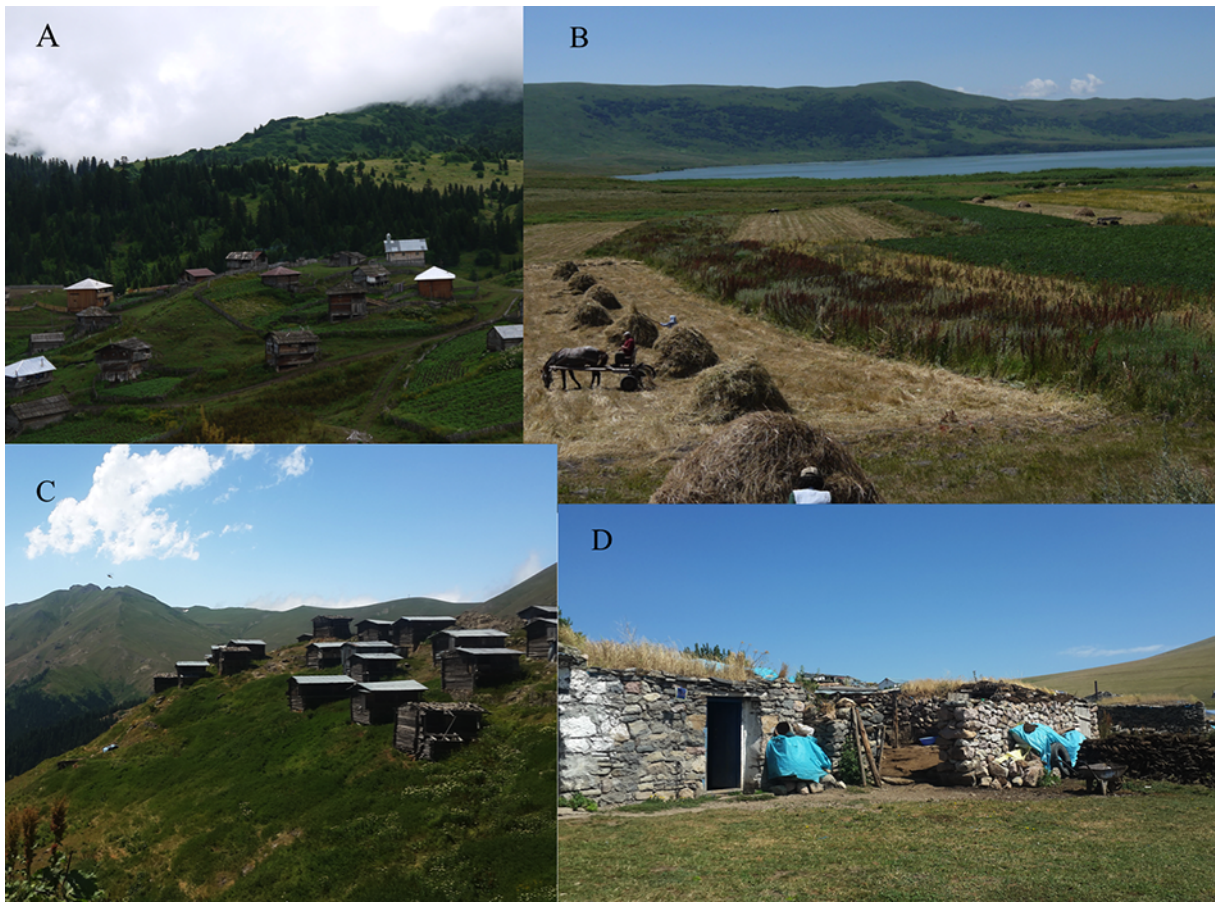


Figure 2 Landscapes from the study area. (A) Adjara; (B) Samtskhe-Javakheti; (C) Artvin; (D) Ardahan. Photos: Soner Oruç.

The initial investigation considered the flora in different vegetation zones (forest, meadow, wetlands, steppe, and rocky areas) en route to and in the vicinity of each selected highland pasture. This process took approximately 2–3 hours for each highland pasture. This reconnaissance involved the identification of wild plants to the species level when possible, in which photographs and a minimum of three samples were collected for each plant. This had a dual purpose: first, to enable the participants to be shown plants to identify and discuss, and second, to prepare herbarium voucher specimens for later detailed identification.

The research team was comprised of three or four people. The first (female) and second (male) authors were always involved in the interviews, together with a translator, either male or female. Throughout the study, the first author was the principal interviewer. In Turkey, the interviews were conducted in the Turkish language, while in Georgia, interviews were conducted in Georgian, Russian, or Turkish. A 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. The interviews were translated into English. The translators were provided with information and terminology relevant to the research 2 weeks before the fieldwork. Information regarding the purpose of the study was provided to all participants and their free, prior informed consent for interviewing, recording, photographing, and/or publishing their knowledge was obtained orally from each participant at the beginning of their interviews. All interviews conformed to the International Society of Ethnobiology's Code of Ethics (International Society of Ethnobiology, 2006).

A snowball technique was used to identify the participants with significant traditional knowledge regarding wild plants and their usage. A majority of the participants were elderly transhumant people. Each participant was interviewed individually for an average of 2 hours using semistructured questionnaires. Usually,



Figure 3 (A) Interview with a participant in their highland house in Samtskhe-Javakheti region (photo: Soner Oruç). (B) Interview in the field by showing fresh plants in Ardahan (photo: Utkan Bugay).

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

Initially, the participants were asked to discuss points about wild plants that they immediately thought of (ca. 15 min). They were then shown fresh plants and asked to identify the vernacular names and usage of the plants (ca. 45 min). Depending on the weather and the participants' willingness, a "walk around the house" was undertaken to observe wild plants in the vicinity (ca. 15 min). To confirm previous information and to gain further learning about various plants, participants were shown an illustrated plant catalog, including 400 plant species from the flora of the region (ca. 45 min). Certain participants were visited a second time to complete the first interview or to confirm the information (Figure 3).

2.3. Taxonomic Identification of Plants

The preliminary identification of plant species was carried out in the field by the authors. The plants were photographed together with their coordinates, and voucher herbarium specimens were prepared by the first author for further identification. Relevant flora resources were used for identification (Davis, 1965–1985; Davis et al., 1988; Güner et al., 2000; K'etskhoveli, 1941–1952; K'etskhoveli et al., 1971–2011; Komarov, 1968–2002). Some of the species were identified through detailed plant and habitat descriptions and previously recorded folk names. Specimens identified in Georgia were stored in the National Herbarium of Georgia (TBI) in Botanical Institute of Ilia State University, while specimens identified in Turkey were stored in the Herbarium of Artvin Çoruh University. Species names were based on the currently accepted names from The Plant List (<http://www.theplantlist.org/>). Furthermore, plant synonyms were provided based on Güner et al. (2012) and Gagnidze (2005).

2.4. 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. Each use in every use-category was counted as one UR. In this study, ethnobotanical data of only wild (noncultivated) plants consumed as vegetables during the fieldwork from 2017 and 2018 were considered in the analysis. We included all of the green aboveground

parts of plants as well as their underground storage organs (roots and bulbs) in the category of wild vegetables, regardless of whether they were used raw or processed by cooking or frying.

These include wild green vegetables and root vegetables that were boiled and/or stewed for dishes, soups, pastries, pickles, wraps, and eaten as snack vegetables. These do not include beverages, fruits, sweets, or spices.

Two indices were used to compare the relative importance of species and the ways in which they were used in each region:

- Relative Frequency of Citation (RFC) (Tardío & Pardo-de-Santayana, 2008):
 $RFC = \frac{FC}{N}$, where FC (frequency of citation) = the number of informants who mentioned the use of the species; N = the number of participants in the survey.
- Cultural Importance Index (CI) (Pardo-de-Santayana et al., 2007):

$$CI = \sum_{i=1}^{i=NU} \frac{URi}{N}, \text{ where } NU = \text{total number of uses; } i \text{ varies from one use to } NU; N = \text{the number of participants in the survey; } UR = \text{use report.}$$

The Pearson correlation coefficient was used to measure the correlation between the age of the participants and the number of species, as well as the age of the participants and the number of use reports. Student's t test was used to determine the relationship between gender and the number of plant species known (initially, the normality of data was checked with the Shapiro–Wilk test). The chi-square test was used to compare the plant parts used, and the methods of preparation mentioned between the locations on both sides of the border. The Mann–Whitney U test was used to test the differences between the mean number of species used in both countries.

3. Results

3.1. Overall Results

Altogether, 1,154 citations of 83 wild plant species used as vegetables were obtained in the study area, of which 45 species were recorded from Georgia and 72 species were recorded from Turkey (Table 1). More than a third of the recorded species (34) were shared on both sides of the border (Figure 4A).

In the comparison of the 122 species-use combinations, participants in both countries shared similar knowledge of 52 use instances (43% of total species-use combinations) (Figure 4B). The most important shared species based on mean CI values were *Urtica* spp. (1.29), *Chaerophyllum* spp. (0.92), *Polygonum bistorta* (0.91), *Heracleum* spp. (0.87), *Rumex crispus* (0.76), *Rumex acetosa* (0.62), *Arctium* spp. (0.55), *Tragopogon* spp. (0.37), *Polygonum aviculare* (0.33), *Anthriscus* spp. (0.28), *Polygonum cognatum* (0.27), *Plantago major* (0.21), *Capsella bursa-pastoris* (0.20), *Rumex acetosella* (0.20), and *Campanula lactiflora* (0.18).

Overall, 83 wild plant species from 23 families were recorded in this study. The best represented families were Apiaceae (11 species) and Asteraceae (seven species) in Georgia, and similarly, Apiaceae (14 species) and Asteraceae (12 species) in Turkey. The most frequently cited genera by more than half of the participants were *Rumex*, *Urtica*, and *Polygonum* in Georgia, and *Polygonum*, *Rumex*, *Urtica*, *Heracleum*, *Chaerophyllum*, and *Arctium* in Turkey. Although *Chaerophyllum* (RFC 0.75), *Arctium* (RFC 0.45), and *Heracleum* (RFC 0.30) species had considerable mentions in Samtskhe-Javakheti in Georgia, they were scarcely recognized by participants in Adjara.

3.2. Plant Knowledge Among Participants

In both countries, women and men mentioned almost the same number of wild vegetable plant species on average. There was no significant relationship between gender and the number of plant species known (Georgia: $t = 0.668$, $df = 37$, $p = 0.51$; Turkey: $t = 1.146$, $df = 63$, $p = 0.26$). On the other hand, there was a very low and nonsignificant correlation between people's age and the number of species

Table 1 Wild plants used as vegetables in the study area.

Latin names of families and species (voucher or digital photograph number) ^a	Recorded local names ^b	Plant part(s) used ^c	Use categories ^d	CI ^e		RFC ^f				Similar use in the literature ^g
				Geo <i>n</i> = 39	Tur <i>n</i> = 65	Adj <i>n</i> = 19	S-J <i>n</i> = 20	Art <i>n</i> = 35	Ard <i>n</i> = 30	
Amaranthaceae										
<i>Amaranthus retroflexus</i> L. (CK, SO 490)	natsarkatama (Geo)	1 L	Boiled and/or stewed dish 1	0.03	0.02	-	*	-	*	3, 6, 8, 10, 11, 12, 16, 17, 18, 19
<i>Atriplex hortensis</i> L. (CK, SO 1535)	<i>unuca</i> , <i>yabani pancar</i> (Tur)	1 A	Boiled and/or stewed dish 1	0	0.03	-	-	-	*	12
<i>Chenopodium</i> spp. (<i>C. album</i> L.) (TBI1060359)	natsarkatama, katamnatsara (Geo); <i>tel pancari</i> , <i>telce</i> , <i>kuş pancari</i> , <i>salmanca</i> , <i>kaz ayağı</i> , <i>sirken</i> , <i>cücük otu</i> (Tur), <i>katamnatsara</i> (Geo)	1 A 2 L	Boiled and/or stewed dish 1, 2 Pickle 1 Snack 2 Pastry 2	0.13	0.28	*	**	*	***	3, 6, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19
<i>Chenopodium foliosum</i> L. (FP-SO 1)	<i>eskeruvi?</i>	1 L	Boiled and/or stewed dish 1	0	0.02	-	-	-	*	6, 10, 18
Amaryllidaceae										
<i>Allium</i> spp. (<i>A. szovitsii</i> Regel) (TBI1060346) (CK, SO 723)	<i>niori</i> (Geo); <i>yabani soğan</i> , <i>yabani sarımsak</i> (Tur)	1 L	Pickle 1 Snack 1	0.03	0.03	-	*	*	-	3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19
Apiaceae										
<i>Anthriscus</i> spp. [<i>A. sylvestris</i> (L.) Hoffm.; <i>A. nemorosa</i> (M. Bieb.) Spreng.] (CK, SO 509, 243) (CK, SO 754)	<i>khima</i> , <i>khimi</i> , <i>ghumi</i> (Geo), <i>ghemi</i> (Arm), <i>kupyr</i> (Rus); <i>kimi</i> , <i>kımı</i> , <i>has kimi</i> (Tur), <i>gımi</i> , <i>ğimi</i> , <i>ğımı</i> (Kur), <i>cil</i> (Tur)	1 A	Pickle 1 Snack 1 Boiled and/or stewed dish 1 Soup 1	0.21	0.32	*	**	*	***	3, 6, 7, 8, 10, 11, 12, 14, 15, 17, 18
<i>Carum carvi</i> L. (TBI1060354) (CK, SO 1559)	<i>çemen otu</i> , <i>çaman</i> , <i>çimen</i> (Tur)	1 A	Boiled and/or stewed dish 1 Snack 1	0.03	0.03	-	*	-	*	8, 12

Continued on next page

Table 1 continued.

Latin names of families and species (voucher or digital photograph number) ^a	Recorded local names ^b	Plant part(s) used ^c	Use categories ^d	CI ^e		RFC ^f				Similar use in the literature ^g
				Geo <i>n</i> = 39	Tur <i>n</i> = 65	Adj <i>n</i> = 19	S-J <i>n</i> = 20	Art <i>n</i> = 35	Ard <i>n</i> = 30	
<i>Chaerophyllum</i> spp. (<i>C. aureum</i> L.; <i>C. bulbosum</i> L.) (TBI1060363, TBI1060357) (FP-SO 2, 3)	ghimi, khumi, ghemi, ghima, gimi (Geo) ghebi, harhanduk, mandak, mendek (Arm), tetu?; <i>kimi, kımi, has kimi, yabani kimi, atol, adol, ettol, adoli, töre, cil, yer elması</i> (Tur), <i>tetroy, ghumi, hoza kımisi, hozaghima</i> (Geo) <i>ğimi, ğımı, gimi, mendik, medik</i> (Kur-Arm)	1 A 2 U 3 L 4 S 5 E	Snack 1, 2, 3, 4, 5 Soup 1, 5, 4 Pickle 1, 2, 3, 4, 5 Boiled and/or stewed dish 1, 2, 4	0.67	1.08	*	****	***	****	2, 8, 9, 10, 11, 12, 14, 15, 17, 18
Unidentified Apiaceae	ghrienchvela, lohkhchima (Geo); <i>ğırınço, ğırınço, ğıranço, ğırançola, ğıriyançola, baldırgan</i> (Tur), <i>sühe</i> (Kur?)	1 A 2 S	Snack 1, 2 Pickle 1	0.05	0.12	-	*	-	**	12
<i>Eryngium</i> spp. (<i>E. billardierei</i> F. Delaroché) (FP-SO 5)	push (Arm); <i>gelenk</i> (Kur), <i>huti</i> (Geo), <i>gırmiço?</i>	1 A 2 S	Snack 1, 2	0.05	0.02	-	*	-	*	1, 6, 7, 8, 11
<i>Falcaria vulgaris</i> Bernh.	<i>kaz ayağı</i> (Tur)	1 A 2 L	Boiled and/or stewed dish 2 Snack 1	0	0.03	-	-	*	*	6, 7, 8, 10, 15, 17, 18, 19
<i>Ferula orientalis</i> L. (FP-SO 6)	<i>çaşır, çakşur, çaşur, çançur, çaşkur, çakşur otu</i> (Tur)	1 A 2 L 3 S	Pickle 1, 2 Snack 3	0.03	0.20	-	*	*	**	3, 6, 7, 8
<i>Heracleum</i> spp. (<i>H. sosnowskyi</i> Manden.; <i>H. trachyloma</i> Fisch. & C. A. Mey.; <i>H. sphondylium</i> L.; <i>H. antasiaticum</i> Manden.; <i>H. platytaenium</i> Boiss.) (TBI1060360) (CK, SO 1338)	dilgha, dilkha, ghırienchvela, telahashi, telaharshi, datvibaba (Geo), <i>kekh, has keh</i> (Arm); <i>kekro, kekiüre, kekre, kekir, kekire, kekre, kırkor, kıcı, kekira, bayır kekrası, bayır kekresi, su kekrosu, su kekresi, keçi kekresi, kerkaç, gülisi, gölisi, cacık, geçi cacığı</i> (Tur-Kur), <i>dikhi, telaharshi</i> (Geo), <i>ğırançola, telehaj, teleharji, telehaj, telekaj, kelehaj</i>	1 A 2 L 3 S	Snack 1, 3 Pickle 1, 3 Boiled and/or stewed dish 3 Soup 3 Wrap (sarma) 2	0.33	1.18	*	**	***	****	3, 5, 6, 7, 8, 10, 11, 12, 14, 15, 16, 17, 18, 19

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Table 1 continued.

Latin names of families and species (voucher or digital photograph number) ^a	Recorded local names ^b	Plant part(s) used ^c	Use categories ^d	CI ^e		RFC ^f				Similar use in the literature ^g
				Geo <i>n</i> = 39	Tur <i>n</i> = 65	Adj <i>n</i> = 19	S-J <i>n</i> = 20	Art <i>n</i> = 35	Ard <i>n</i> = 30	
Asparagaceae										
<i>Asparagus officinalis</i> L.	satatsuri (Geo); <i>zatatol?</i> , <i>kuşkovan</i> , <i>kuşkonmaz</i> (Tur)	1 A 2 S	Boiled and/or stewed dish 1, 2	0.03	0.02	-	*	*	-	11, 15, 19
<i>Scilla monanthos</i> K. Koch (FP-SO 7)	<i>it soğanı</i> (Tur), <i>sirmasan</i> , <i>sirpivaz</i> (Kur)	1 U	Snack 1	0	0.02	-	-	-	*	NO
Asteraceae										
<i>Arctium</i> spp. [<i>A. platylepis</i> (Boiss. & Balansa) Sosn. ex Grossh; <i>A. tomentosum</i> Mill.; <i>A. lappa</i> L.] (TBI1060345) (CK, SO 1387, 1619)	ghalaghunta, ghalagunta, dzirkvena, orovani (Geo), krodruk (Arm), kabalak (Tur), sherepuk, lopukh (Rus); <i>diken</i> , <i>kabalak</i> , <i>düğe tabanı</i> , <i>deve tabanı</i> (Tur), <i>hunta</i> , <i>elahunta</i> , <i>alahunda</i> , <i>durhuna</i> , <i>dilhuna</i> , <i>dilgvina</i> (Geo), <i>geleng</i> , <i>hozik</i> , <i>gelem</i> (Kur), <i>huti</i> , <i>huta</i> , <i>hozaghimay</i> , <i>hozaghima</i>	1 A 2 E 3 U 4 L 5 S	Snack 2, 3, 5 Soup 4, 5 Wrap (Sarma) 1, 4 Pickle 4, 5	0.23	0.74	-	***	***	****	1, 2, 6, 8, 11, 15, 16, 17, 18
<i>Carduus</i> spp. (<i>C. nutans</i> L.) (FP-SO 10)	<i>diken</i> , <i>tiken</i> (Tur)	1 S	Snack 1	0	0.03	-	-	-	*	5, 6, 8
<i>Cirsium</i> spp. [<i>C. echinus</i> (M. Bieb.; <i>Cirsium obvallatum</i> (M. Bieb.) M. Bieb.) Hand.-Mazz.] (CK, SO 32) (FP-SO 11, 12)	push (Arm); <i>diken</i> , <i>keçi diken</i> , <i>kobuk</i> , <i>beyaz diken</i> (Tur)	1 A 2 S 3 U 4 R	Snack 2, 3, 4 Pickle 1	0.05	0.11	-	*	*	*	2, 4, 6, 8, 10, 11, 12, 13, 14, 15, 16, 17, 18
<i>Echinops</i> spp. (<i>E. pungens</i> Trautv.; <i>E. sphaerocephalus</i> L.) (TBI1060347) (CK, SO 1556)	kotochina, motsotsina, jorekala (Geo), <i>topuz</i> (Tur), <i>kozoz?</i> ; <i>toptopik topuz</i> , <i>tup tup</i> , <i>yağlı diken</i> , <i>çobuk</i> (Tur), <i>hoşnik?</i>	1 R	Snack 1	0.21	0.28	-	***	*	***	2, 3, 6, 8

Continued on next page

Table 1 continued.

Latin names of families and species (voucher or digital photograph number) ^a	Recorded local names ^b	Plant part(s) used ^c	Use categories ^d	CI ^e		RFC ^f				Similar use in the literature ^g
				Geo n = 39	Tur n = 65	Adj n = 19	S-J n = 20	Art n = 35	Ard n = 30	
<i>Trachystemon orientalis</i> (L.) G. Do	burtkilai (Geo); <i>bulvi, burği, burgu, burgi</i> (Laz), <i>purği, purge</i> (Arm), <i>bulgo, burgva</i> (Geo)	1 A 2 S	Pickle 1, 2 Boiled and/or stewed dish 2	0.03	0.17	*	-	**	*	5, 9, 12, 17
<i>Taraxacum</i> spp. (TBI1060356) (CK, SO 1289)	khadudik, khatutik (Arm), <i>babuatsvera, satovlia</i> (Geo); <i>kaz ayağı</i> (Tur), <i>pızbizek</i> (Kur)	1 A 2 U 3 L	Snack 1, 2, 3 Boiled and/or stewed dish 1, 3 Pickle 3	0.1	0.03	*	*	-	*	3, 6, 8, 11, 12, 13, 15, 17, 18
<i>Tragopogon</i> spp. [<i>T. buphthalmoides</i> (DC.) Boiss.; <i>T. reticulatus</i> Boiss. & A. Huet] (TBI1060361) (FP-SO 15)	yemlik (Tur), <i>sintz, sindz</i> (Arm), <i>phamphara</i> (Geo); <i>sıpink, sıplink, sipink, süpilink</i> (Kur), <i>poşu?</i> , <i>pampar otu, pampara, yemlik, kaymak çiçeği</i> (Tur)	1 A 2 L 3 S	Snack 1, 2, 3 Boiled and/or stewed dish 2 Pickle 1	0.23	0.45	-	***	*	****	1, 2, 3, 6, 7, 8, 10, 11, 15, 17, 18
<i>Tussilago farfara</i> L. (FP-SO 16) (FP-SO 17)	<i>elma yaprağı, bir yüzlü yaprak</i> (Tur)	1 L	Wrap (sarma) 1	0	0.05	-	-	*	*	7, 15, 16, 17
Brassicaceae										
<i>Armoracia rusticana</i> P. Gaertn., B. Mey. & Scherb.	khren, khreni (Rus)	1 L 2 U	Pickle 1 Soup 1, 2	0.13	0	*	*	-	-	9, 11, 12, 13, 14, 15, 16, 17, 19
<i>Bunias orientalis</i> L. (FP-SO 19)	<i>acıgıcı</i> (Tur), <i>tita</i>	1 A 2 L	Snack 1, 2	0	0.05	-	-	-	*	6, 8, 10, 12
<i>Capsella bursa-pastoris</i> (L.) Medik. (CK, SO 538) (CK, SO 289)	mtskemsis chanta (Geo), <i>pastusha sumka, pastushi sumka</i> (Rus); <i>piçok, ğıcı, selmasık</i> (Kur), <i>dere maydanozu, kuş ekmeği, dede otu, çoban dürmeği, civciv otu, acıgıcı, kuş pepe, kuş pancarı, kaz otu</i> (Tur), <i>tita</i>	1 A 2 L	Snack 1, 2 Boiled and/or stewed dish 1	0.15	0.23	*	**	*	**	2, 3, 6, 8, 10, 11, 12, 13, 14, 15, 16, 18

Continued on next page

Table 1 continued.

Latin names of families and species (voucher or digital photograph number) ^a	Recorded local names ^b	Plant part(s) used ^c	Use categories ^d	CI ^e		RFC ^f				Similar use in the literature ^g
				Geo n = 39	Tur n = 65	Adj n = 19	S-J n = 20	Art n = 35	Ard n = 30	
<i>Cardamine</i> spp. (<i>C. hirsuta</i> L.; <i>C. raphanifolia</i> Pourr.; <i>C. uliginosa</i> M. Bieb.) (FP-SO 20, 21)	<i>tere, tita, yaban teresi, acıgıcı, yabani tere, yabani roka, roka</i> (Tur), <i>ğıçı, kıçı</i> (Kur), <i>sukupiyi</i> (Laz), <i>godim, gedim</i> (Arm)	1 A 2 L 3 S	Snack 1, 2, 3	0	0.20	-	-	**	*	6, 8, 11, 12, 13
<i>Rapistrum rugosum</i> (L.) All. (FP-SO 23)	<i>tita; acıgıcı</i> (Tur)	1 A	Snack 1	0.03	0.02	-	*	-	*	6
<i>Sinapis arvensis</i> L. (FP-SO 24)	<i>eşekturpu</i> (Tur)	1 L	Snack 1	0	0.02	-	-	-	*	1, 3, 8, 10, 11, 12
<i>Sisymbrium loeselii</i> L. (FP-SO 25)	<i>tita, dida, yabani turp, eşekturpu</i> (Tur)	1 A 2 L	Snack 1, 2	0	0.06	-	-	-	*	NO
Campanulaceae										
<i>Campanula</i> spp. (<i>C. lactiflora</i> M. Bieb.; <i>C. rapunculoides</i> L.) (FP-SO 41) (CK, SO 502)	<i>dondolo</i> (Geo); <i>dondolo</i> (Geo), <i>pencer</i> (Tur)	1 A 2 L 3 S 4 E	Snack 1, 3, 4 Boiled and/or stewed dish 1, 2 Pickle 1, 3, 4	0.41	0.08	***	*	*	*	9, 11, 12, 14, 18, 19
Caryophyllaceae										
<i>Silene</i> spp. [<i>S. latifolia</i> Poir.; <i>S. vulgaris</i> (Moench) Garcke] (TBI1060350) (CK, SO 651)	<i>olena</i> (Rus); <i>civanay, çırçırık</i> (Tur)	1 A 2 L 3 S	Snack 2, 3 Boiled and/or stewed dish 1, 2 Pickle 2	0.15	0.06	**	-	*	*	6, 7, 8, 9, 12, 14, 17, 19
<i>Stellaria media</i> (L.) Vill.	<i>çunaçuna, cunacuna</i> (Tur)	1 L	Snack 1	0	0.02	-	-	-	*	4, 5, 13, 15, 16, 18
Colchicaceae										
<i>Colchicum</i> sp.	<i>olena</i> (Rus), <i>olenay</i>	1 A	Pickle 1	0.03	0	-	*	-	-	2, 3
Convolvulaceae										
<i>Convolvulus arvensis</i> L. (CK, SO 30)	<i>patatuk, patatuki</i> (Arm)	1 A 2 L	Boiled and/or stewed dish 1, 2	0.05	0	-	*	-	-	6, 10, 19

Continued on next page

Table 1 *continued.*

Latin names of families and species (voucher or digital photograph number) ^a	Recorded local names ^b	Plant part(s) used ^c	Use categories ^d	CI ^e		RFC ^f				Similar use in the literature ^g
				Geo	Tur	Adj	S-J	Art	Ard	
				<i>n</i> = 39	<i>n</i> = 65	<i>n</i> = 19	<i>n</i> = 20	<i>n</i> = 35	<i>n</i> = 30	
Crassulaceae										
<i>Sedum</i> spp. (<i>S. album</i> L.; <i>S. telephium</i> L.) (FP-SO 27)	saknatuna, kilitavashli (Geo),	1 A	Snack 1, 2	0.13	0.17	*	*	*	*	1, 3, 5, 6, 8, 10, 11, 12
	mamur (Arm); <i>hatun parmağı, elmacık, camış kulağı, at dişi, kaya elması</i> (Tur), <i>picibiri</i> (Kur), <i>tiknikura</i> (Geo)	2 L	Boiled and/or stewed dish 1, 2 Pickle 2 Soup 2							
<i>Sempervivum</i> spp. [<i>S. caucasicum</i> Rupr. ex Boiss; <i>S. brevipilum</i> Muirhead; <i>S. minus</i> Turrill ex Wale; <i>S. davisii</i> subsp. <i>furseorum</i> (Muirhead) Karaer] (FP-SO 28, 29, 30)	<i>gelin parmağı, çoban ekmeği,</i>	1 A	Snack 1, 2	0	0.35	-	-	*	***	10, 11, 12, 17, 18
	<i>ayı pençesi, keçi trnağı, gelin trnağı</i> (Tur), <i>sikatola? trnağı piye</i> (Kur), <i>vashlay</i> (Geo),	2 L	Boiled and/or stewed dish 1, 2 Pickle 2							
Fabaceae										
<i>Lathyrus</i> sp. (<i>L. tuberosus</i> L.) (FP-SO 32)	<i>çunaçuna, cunacuna, cinacora, cinacura</i> (Tur)	1 A 2 L 3 U	Snack 1, 2, 3	0	0.08	-	-	*	*	2, 3, 6, 8, 9, 12, 14, 17, 18, 19
Iridaceae										
<i>Crocus</i> spp. (<i>C. vallicola</i> Herb.; <i>C. suworowianus</i> K. Koch) (FP-SO 31) (FP-SO 26)	<i>zaphrana, satovlia</i> (Geo); <i>kar çiçeği, yerelması, yaylakovan, çiğdem, şaşortikovan, nenekovan, şaşortikalay, yayla mısırı, yayla çiçeği, şaşortkovani</i> (Tur)	1 U	Snack 1 Boiled and/or stewed dish 1	0.13	0.25	*	*	**	*	1, 15, 17
Lamiaceae										
<i>Salvia glutinosa</i> L. (TBI1060352)	<i>purçumela</i> (Laz)	1 L	Boiled and/or stewed dish 1	0.03	0	*	-	-	-	NO
<i>Salvia verticillata</i> L. (FP-SO 34)	<i>öküz kuyruğu</i> (Tur), <i>boçkağan</i> (Kur)	1 S	Snack 1	0	0.02	-	-	-	*	1, 8, 14

Continued on next page

Table 1 continued.										
Latin names of families and species (voucher or digital photograph number) ^a	Recorded local names ^b	Plant part(s) used ^c	Use categories ^d	CI ^e		RFC ^f				Similar use in the literature ^g
				Geo	Tur	Adj	S-J	Art	Ard	
				n = 39	n = 65	n = 19	n = 20	n = 35	n = 30	
Malvaceae										
<i>Malva</i> spp. (<i>M. neglecta</i> Wallr.; <i>M. sylvestris</i> L.) (TBI1060351) (CK, SO 1686, 1745)	<i>gorgit</i> , <i>kuş pepesi</i> , <i>ebegümeçi</i> , <i>dolik</i> , <i>kömeç</i> , <i>körmeç</i> , <i>gorcolo otu</i> , <i>korkut</i> , <i>kömeç</i> , <i>körmen</i> (Tur), <i>moloka</i> , <i>korkotina</i> , <i>korkotai</i> (Geo), <i>sırkok</i> (Kur)	1 A 2 L	Boiled and/or stewed dish 1, 2 Soup 1, 2 Wrap (sarma) 2	0	0.34	-	-	*	**	1, 2, 3, 6, 7, 8, 9, 10, 11, 12, 13, 15, 16, 17, 18, 19
Papaveraceae										
<i>Papaver orientale</i> L. (TBI1060349) (CK, SO 1561)	<i>kakacho</i> , (Geo)	1 A 2 L 3 S	Snack 3 Boiled and/or stewed dish 1, 2	0.1	0	-	**	-	-	8, 15, 18
Plantaginaceae										
<i>Plantago major</i> L. (TBI1060348) (CK, SO 53, 1563)	<i>yezani lezu</i> (Arm); <i>belhavis</i> , <i>belghavis</i> , <i>belghebis</i> , <i>belghavas</i> (Kur), <i>mravaldzargya</i> (Geo), <i>bağa</i> , <i>belbağı</i> , <i>yara yaprağı</i> , <i>bağ yaprağı</i> , <i>bağa yaprağı</i> , <i>yara otu</i> , <i>yedi damar otu</i> (Tur), <i>garduk</i> , <i>ohte damar</i> (Arm)	1 L	Snack 1 Boiled and/or stewed dish 1 Wrap (sarma) 1	0.03	0.32	-	*	**	**	3, 4, 6, 8, 14, 15, 16, 17, 18
Polygonaceae										
<i>Polygonum</i> spp. (<i>P. aviculare</i> L.; <i>P. cognatum</i> Meisn.) (FP-SO 35)	<i>matitela</i> (Geo), <i>çencar</i> , <i>cancar</i> (Arm), <i>gorets sporish</i> (Rus); <i>cacık</i> , <i>kuş ekmeği</i> , <i>kuş otu</i> , <i>kuş pancarı</i> , <i>kuş pepeği</i> , <i>kuş pepesi</i> , <i>madımak</i> , <i>madamak</i> , <i>madımalak</i> , <i>matitel</i> , <i>pencer</i> , <i>telce</i> (Tur), <i>paluği cuçki</i> (Kur)	1 A 2 L	Snack 1, 2 Boiled and/or stewed dish 1, 2 Soup 1, 2 Pickle 1, 2	0.26	0.8	*	**	***	****	1, 2, 3, 6, 7, 8, 9, 11, 14, 15, 17, 18

Continued on next page

Table 1 continued.

Latin names of families and species (voucher or digital photograph number) ^a	Recorded local names ^b	Plant part(s) used ^c	Use categories ^d	CI ^e		RFC ^f				Similar use in the literature ^g
				Geo n = 39	Tur n = 65	Adj n = 19	S-J n = 20	Art n = 35	Ard n = 30	
<i>Polygonum</i> spp. (<i>P. bistorta</i> L.; <i>P. bistorta</i> subsp. <i>carneum</i> Coode & Cullen) (CK, SO 68) (FP-SO 39, 40)	dvalura, dvaluri (Geo); çayır pancarı, dağ pancarı, kızılıçık pancarı, pancar otu, pazı pancarı, pencar, yabani pancar, yayla lahanası, yayla pancarı (Tur), ghali, tiphala, dvalura (Geo), yaylaşi luku (Laz)	1 A 2 L 1 S	Snack 1, 2, 3 Boiled and/or stewed dish 1, 2 Soup 1, 2 Pickle 1, 2 Wrap (sarma) 2	0.49	1.17	****	*	****	****	3, 5, 8, 14, 19
<i>Rumex</i> sp. (<i>R. acetosa</i> ; <i>R. acetosella</i> ; <i>R. scutatus</i>) (TBI1060353) (CK, SO 1454, 1541, 73)	kukumzhava, kakamjova, kokomzhava (Geo), kuzukulağı (Tur), shevil shavel (Rus), tetu tetergich, tetvash (Arm); çağuna, çağunay, çarghela, çarhala, çavutay, mjauda, kokomjava, mjauna (Geo), kızılpençarı, kuzukulağı, evelik (Tur), kızı, gıhbelghi, tırşo, tırşobelg, tırşoderha, tırşoga, turşo (Kur)	1 A 2 L	Snack 1, 2 Boiled and/or stewed dish 1, 2 Soup 2 Pickle 1, 2 Wrap (sarma) 2	0.55	1.05	****	*	***	****	1, 5, 6, 7, 8, 9, 10, 11, 12, 13, 15, 16, 17, 18, 19
<i>Rumex</i> spp. (<i>R. crispus</i> L.; <i>R. alpinus</i> L.; <i>R. patientia</i> L.) (FP-SO 38) (CK, SO 654, 776)	aveluk (Arm), ghalo, ghvalo, kokomzhava, kukumzhava (Geo), övelik (Tur); at kulağı, ebelik, evelek, evelik (Tur), çarghala, çarghela, çarhala, ğalo, gholo, ghvalo	1 A 2 L 3 U	Snack 1 Boiled and/or stewed dish 1, 2 Soup 1, 2, 3 Pickle 1, 2, 3 Wrap (sarma) 2	0.59	1.27	*	****	***	****	1, 2, 3, 6, 7, 8, 10, 11, 12, 13, 14, 15, 16, 17, 19

Continued on next page

Table 1 continued.

Latin names of families and species (voucher or digital photograph number) ^a	Recorded local names ^b	Plant part(s) used ^c	Use categories ^d	CI ^e		RFC ^f				Similar use in the literature ^g
				Geo <i>n</i> = 39	Tur <i>n</i> = 65	Adj <i>n</i> = 19	S-J <i>n</i> = 20	Art <i>n</i> = 35	Ard <i>n</i> = 30	
Portulacaceae										
<i>Portulaca oleracea</i> L.	danduri, danduri, mraval pekha (Geo); <i>semiz otu</i> (Tur)	1 A	Snack 1 Boiled and/or stewed dish 1 Pickle 1	0.13	0.03	-	**	*	*	8, 9, 11, 13, 14, 15, 17, 18, 19
Primulaceae										
<i>Cyclamen</i> sp.	kochivarda (Geo)	1 L	Snack 1	0.03	0	*	-	-	-	11
<i>Primula</i> spp. (<i>P. woronowii</i> Losinsk.; <i>P. veris</i> L.)	satsripina (Geo), baranchki (Rus)	1 L	Boiled and/or stewed dish 1	0.05	0	*	*	-	-	6, 11, 12, 13, 14, 15, 19
Ranunculaceae										
<i>Caltha palustris</i> L. (FP-SO 36)	<i>pispisk</i> , <i>bizbizik</i> , <i>bizik</i> (Kur), <i>düdüklük</i> (Tur)	1 A 2 L	Boiled and/or stewed dish 1, 2 Wrap (sarma) 2	0	0.06	-	-	-	*	6, 8, 17
Rosaceae										
<i>Aruncus vulgaris</i> (Maxim.) Raf. ex Pojark. (TBI1060355)	ajhorika, ajharkela (Geo); <i>açikele</i> , <i>ancorikay</i> , <i>ancorika</i> , <i>arçikela</i> , <i>sarbedelan</i>	1 A 2 L 3 S	Boiled and/or stewed dish 1, 2 Snack 3 Pickle 1, 2, 3	0.23	0.09	**	-	*	*	9, 11, 12, 14, 19
<i>Filipendula vulgaris</i> Moench (FP-SO 37)	<i>at kulağı</i> (Tur)	1 S	Snack 1	0	0.02	-	-	-	*	16

Continued on next page

Table 1 continued.

Latin names of families and species (voucher or digital photograph number) ^a	Recorded local names ^b	Plant part(s) used ^c	Use categories ^d	CI ^e		RFC ^f				Similar use in the literature ^g
				Geo <i>n</i> = 39	Tur <i>n</i> = 65	Adj <i>n</i> = 19	S-J <i>n</i> = 20	Art <i>n</i> = 35	Ard <i>n</i> = 30	
Urticaceae										
<i>Urtica</i> spp. (mainly <i>Urtica dioica</i> L.) (TBI1060358) (CK, SO 1526)	chinchari, jhinchari, (Geo), aghinch, yeghinch, gecan, haci, kecan (Arm), asırgan (Tur), kırıpıva (Rus); <i>ağınç</i> (Arm), <i>cinca</i> , <i>cinca</i> , <i>çinca</i> , <i>çinca</i> , <i>zincara</i> , <i>çinçari</i> , <i>cacır</i> , <i>cancır</i> , <i>dıçkıçi</i> (Laz), <i>gevgöz</i> , <i>gezgezlik</i> , <i>geznik</i> (Kur), <i>ısırgan</i> (Tur)	1 A 2 E 3 L	Snack 1, 3 Boiled and/or stewed dish 1, 3 Pastry 2 Soup 1, 3 Wrap (sarma) 1 Pickle 1	1	1.46	****	****	****	****	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19

^a “CK, SO (number)” – plant species collected by Ceren Kazancı and Soner Oruç; “FP-SO (number)” – field photo number of the specimen by Soner Oruç. Bold numbers indicate specimens from Georgia and others from Turkey. The species photographs are available in Zenodo (Kazancı, 2021).

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

^c Each different number (1, 2, 3...) indicates the plant part used in the recipe. A – aerial parts; E – entire plant; L – leaves; S – stems; U – underground parts; R – receptacles.

^d Numbers written in bold are shared reports between participants in both countries; italics are associated with the recipes from Turkey; the rest are from Georgia. Each number (1, 2, 3...) at the end of the method of use matches the plant parts used.

^e The Cultural Importance Values in Georgia (Geo) and in Turkey (Tur).

^f “*” sign gives range of the relative frequency of citation values in four administrative regions. 0 = -; 0 < * < 20; 20 ≤ ** < 40; 40 ≤ *** < 60; 60 ≤ ****. Adj – Adjara; S-J – Samtskhe-Javakheti; Art – Artvin; Ard – Ardahan.

^g Numbers and its corresponding references: 1 – Özgen et al. (2004); 2 – Akgül (2007); 3 – Güneş and Özhatay (2011); 4 – Sağıroğlu et al. (2012); 5 – Saraç et al. (2013); 6 – Çakır (2017); 7 – Karakaya et al. (2019); 8 – Kadioğlu et al. (2020); 9 – Bussmann et al. (2016); 10 – Hovsepian et al. (2016); 11 – Bussmann et al. (2017a); 12 – Bussmann et al. (2017b); 13 – Łuczaj et al. (2017); 14 – Bussmann et al. (2018); 15 – Pieroni and Sökand (2019); 16 – Sökand and Pieroni (2019); 17 – Pieroni et al. (2020); 18 – Bussmann, Paniagua Zambrana, Sikharulidze, Kikvidze, Kikodze, et al. (2020); 19 – Bussmann, Paniagua Zambrana, Sikharulidze, Darchidze, et al. (2020); NO indicates that no use is reported in the cited references.

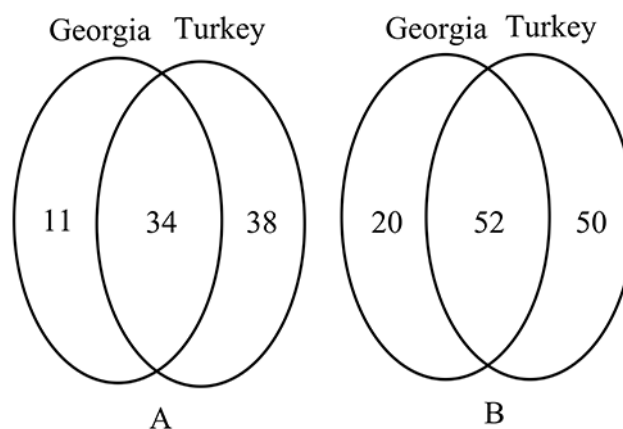


Figure 4 Venn diagram depicting overlaps among studied communities in number of wild vegetable plant species (A) and number of species-use combinations (B).

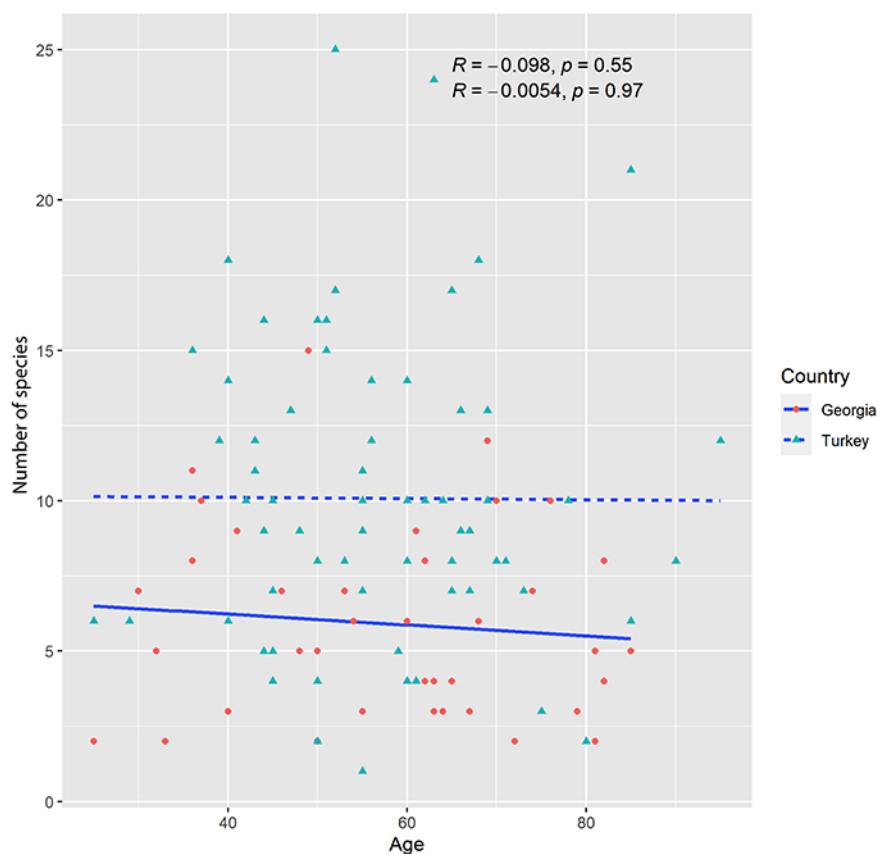


Figure 5 The figure depicts the correlation between age and number of species known by participants in each country.

known in both countries (Georgia: $r = -0.098$, $p = 0.55$; Turkey: $r = -0.0054$, $p = 0.97$) (Figure 5). Similarly, there was a nonsignificant correlation between the age of the individuals and the number of species-uses in both countries (Georgia: $r = -0.15$, $p = 0.37$; Turkey: $r = 0.03$, $p = 0.81$) (Figure 6).

Overall, the informants on the Turkish side of the border mentioned more species than on the Georgian side (mean of species: $10.1 \pm SD$ and $5.9 \pm SD$, respectively).

In summary, we rejected the first two hypotheses presented in the introduction. The number of species used was significantly higher on the Turkish side, and there

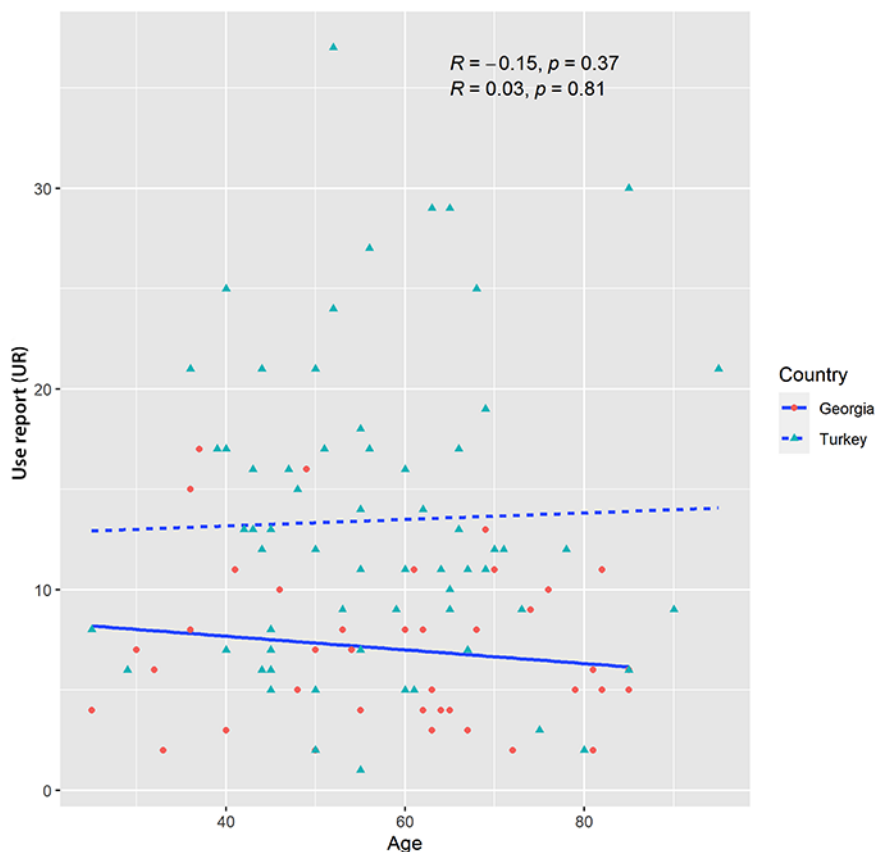


Figure 6 The figure depicts the correlation between age and number of uses for participants in each country.

was no significant correlation between the age of the participants and the number of species listed. However, as we predicted, both genders had similar knowledge of wild vegetables.

3.3. Comparison Between Four Administrative Regions

The highest number of plants were mentioned in Ardahan (64 species), followed by Artvin (39), Samtskhe-Javakheti (37), and Adjara (21 species). Fourteen plant species were reported throughout the entire study area in each administrative region, 12 of which were also found among the 15 most culturally important species (Figure 7), namely *Urtica dioica*, *Rumex crispus*, *Chaerophyllum* spp., *Polygonum bistorta*, *Rumex acetosa*, *Rumex acetosella*, *Heracleum* spp., *Polygonum cognatum*, *Anthriscus* spp., *Campanula lactiflora*, *Capsella bursa-pastoris*, and *Crocus* spp.

The most popular genera used by the majority of the participants (RFC \geq 0.7) in all regions were *Urtica* spp. (mostly *Urtica dioica*) and *Rumex* spp. *Urtica* spp. have similar cultural significance, with comparable CI values in each administrative region (Figure 7). While *Rumex crispus* is used mainly in the Ardahan and Samtskhe-Javakheti regions, *R. acetosella* and *R. acetosa* are popular chiefly in the Ardahan and Adjara regions. *Polygonum bistorta* was popular in Artvin, Ardahan, and Adjara (RFC \geq 0.7) but scarcely reported in Samtskhe-Javakheti (RFC 0.05). *Chaerophyllum* spp. have significant and comparable cultural importance in Ardahan, Samtskhe-Javakheti, and Artvin, but a very low CI value in Adjara. There were also several species that were exclusively mentioned in one administrative region, such as *Campanula lactiflora* (RFC 0.53) and *Aruncus vulgaris* (RFC 0.32) in the Adjara region. *Sempervivum* species (RFC 0.53) were also popular only in Ardahan. They occur in rocky habitats at high altitudes, have mostly been appreciated by shepherds, and are called “çoban ekmeği” in Turkish, which literally

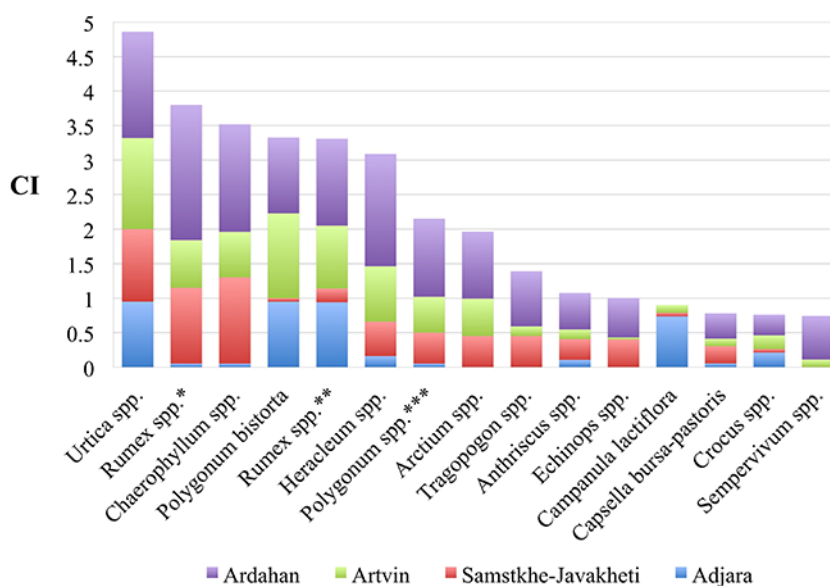


Figure 7 The 15 plant species that were culturally most important in the study area and comparison of the CI index values in each region. * *Rumex* spp. (*R. crispus* and *R. patientia*); ** *Rumex* spp. (*R. acetosa* and *R. acetocella*); *** *Polygonum* spp. (*P. cognatum* and *P. aviculare*). *Rumex* spp. have been divided into two groups according to their local names, ways of use, and tastes.

translates to “shepherd’s bread”. Similarly, *Echinops* and *Tragopogon* species are highly popular in Ardahan and Samtskhe-Javakheti, but not in Artvin or Adjara.

3.4. Plant Parts Used and Preparation Methods

Wild vegetables are consumed in various ways in the study area. Young aerial parts are consumed in almost every possible way. The plant parts used were not significantly different across the border (chi-squared test value = 2.96, $df = 5$, $p = 0.71$). The cultural importance of use categories and the number of species used for each category in the four administrative regions are compared in Figure 8. A significant difference in plant use categories across the border was found (chi-squared test value = 60.7, $df = 5$, $p < 0.05$). The main methods of consumption in the study area were raw, as a snack, and processed. Raw snacks are more frequently used in Turkey than in Georgia. This is especially apparent in Ardahan, the only region where consumption as a raw snack (74% of the reported genera) predominates over processed consumption (63%). The young aerial parts of *Rumex* and *Tragopogon*, young stems of *Heracleum*, young stems and underground parts of *Arctium*, underground parts of *Chaerophyllum*, receptacles of *Echinops*, and leaves of *Sempervivum* are the preferred snack vegetables in Ardahan. On the other hand, raw consumption is uncommon in Adjara, where 50% of the genera are consumed raw, whereas 83% of them are processed.

The most common preparation methods on both sides of the border were as boiled and/or stewed dishes. Young leaves or aerial parts of Polygonaceae and Urticaceae family members were mostly mentioned in this category. *Urtica dioica*, *Rumex crispus*, and *Polygonum bistorta* were the preferred species in Georgia. *Urtica dioica*, *Polygonum bistorta*, *P. aviculare*, *P. cognatum*, and *Rumex crispus* were the most widely used vegetable species in Turkey. “Pkhali” is the main boiled dish with various recipes mentioned by Georgia participants in this category. The two most common recipes in this study included boiling, squeezing, and chopping the plants, then either stewing them with onion in oil or occasionally with eggs, or mixing them together with garlic, coriander, and walnut. It has been reported that pkhali recipes can be prepared with a single plant species, usually with a mixture of several spring plants, such as *Aruncus vulgaris*, *Campanula lactiflora*, *Capsella bursa-pastoris*,

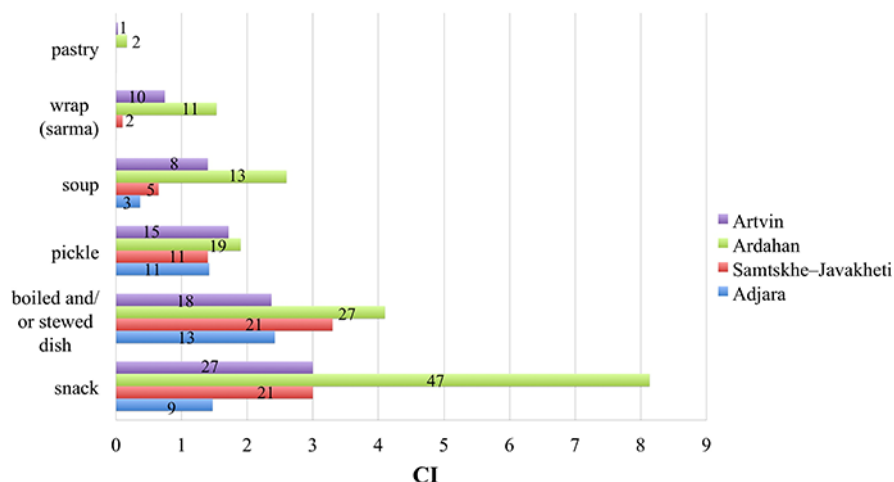


Figure 8 Cultural importance of use categories and the number of species used in each category in four administrative regions.

Chaerophyllum spp., *Chenopodium album*, *Convolvulus arvensis*, *Polygonum aviculare*, *P. bistorta*, *Rumex acetosa*, *R. crispus*, and *Urtica dioica*. Although the above recipes are shared among participants on both sides of the border, dishes in Turkey are also prepared by stewing plants with bulgur or rice after mixing them with fried onion in Turkey.

Ardahan was distinguished from other regions by its larger number of root vegetables. Six genera were appreciated for their underground parts. The most widely used species based on RFC were *Chaerophyllum*, *Crocus*, and *Arctium*.

Lacto-fermented pickling is another widely applied form of consumption and is represented by 30 species in this study. Young aerial parts of *Chaerophyllum*, *Heracleum*, and *Anthriscus* species are used in all regions, but there were few reports from Adjara. Local people were observed selling pickles prepared from these plants along the roadsides, especially in the Samtskhe–Javakheti region (Figure 9). There were also several species exclusively used in one region, such as the peeled stems and leaves of *Trachystemon orientalis* in Artvin, young aerial parts of *Campanula lactiflora*, *Aruncus vulgaris*, *Polygonum bistorta*, and *Silene* spp. in Adjara. The most common and rapid method for pickling in Turkey is preserving slightly boiled and drained plants in whey “şirat” and salt, and occasionally with garlic. However, whey (liquids left after cheese making) is rarely used in Georgia, where pickles are produced through lactic fermentation in salty water with other flavorings such as garlic, pepper, dill, coriander, and parsley.

Both fresh and dried (for winter) consumption of young aerial parts of plants in soups were mostly preferred in Turkey. Young aerial parts of *Urtica dioica* and *Polygonum bistorta* were widely used in soups in Artvin and Ardahan. The soup of *Polygonum bistorta* has a particularly special significance in transhumant life in Artvin (Figure 10), where several summer festivals have been named after the plant, which they call “yayla pancarı.” Although people used to gather this plant and eat the “yayla pancarı” soup together for healing, nowadays the plant is used individually and remains a symbol through the names of the festivals. Several participants transplanted the species and grew them in their highland homegardens. Similarly, in Georgia, it is known for its delicious and healthy leaves, which are used with milk and cream to make a unique soup. This soup is considered as a panacea. *Rumex crispus* is another popular species used in soups in the Ardahan and Samtskhe–Javakheti regions. Fresh or mainly dried braided leaves of the plant were prepared as a winter soup (Figure 10). Boiled leaves were mixed with dairy products (milk, cream, ayran, yogurt, cheese, or whey) and/or flour or cereal varieties (corn, wheat, and rice). Alternatively, this soup mixture was prepared with eggs.



Figure 9 (A) Preparing young aerial parts of *Chaerophyllum* for making pickle in Samtskhe-Javakheti. (B) *Heracleum* species growing naturally in the garden of participants house in Ardahan. (C) Local people are selling *Heracleum* and *Chaerophyllum* pickles in front of their houses in Samtskhe-Javakheti. (D) The stems of *Heracleum* are eaten fresh or cooked. Photos: Soner Oruç.

The wrap (sarma) is also a common method of consumption only in Turkey. Thirteen species were used in this way in Turkey. The most common species were *Rumex* spp. (mostly *R. crispus*) and *Plantago major* in Ardahan and Artvin. Generally, bulgur or rice were wrapped in the leaves of these species. *Arctium* spp. were also preferred mostly in Ardahan. On the other hand, only two species (*Rumex crispus* and *Plantago major*) were mentioned, and only rarely, as being used to prepare wraps (sarma) in Samtskhe-Javakheti in Georgia. Some recipes reported in the study area include the leaves of *Caltha palustris* consumed as a wrap (sarma).

Although infrequently, young aerial parts of *Chenopodium album* and *Urtica dioica* species were used in stuffing for pastry (katmer, börek) in Turkey. No wild vegetable species for stuffing pastry in Georgia were reported in this study.

4. Discussion

Regional differences in the number of plant species recorded in each administrative region may be partly due to the differences in the number of interviews carried out as well as habitat types of each region. Communities living in open lands (in Ardahan and Samtskhe-Javakheti) seem to use more diverse wild vegetable plants than communities living close to the forests (in Artvin and Adjara).

Considering the floral similarity across the border, the number of common species used and vegetable plant knowledge shared among communities was quite low. However, there was not much difference in terms of the most frequently cited and culturally important species with several uses. Nevertheless, some of the most important shared species (*Heracleum*, *Chaerophyllum*, *Arctium*, and *Campanula* spp.) diverge significantly in recognition on a regional scale, between Adjara and



Figure 10 (A) Natural vegetation with *Polygonum bistorta* in the subalpine meadows in Ardahan. (B) Dried *Polygonum bistorta* leaves for the preparation of soup in Artvin. (C) Transplanted *Polygonum bistorta* cultivated in the garden of the highland houses in Artvin. (D) Braided *Rumex crispus* leaves are dried for preparing soup in winter in Samtskhe-Javakheti. Photos: Soner Oruç.

Samtskhe-Javakheti. This might be due to differences in the frequencies of species occurrences and cultural differences among communities in these regions.

A comparison of the present study with relevant literature related to folk knowledge of edible plants, especially from the South Caucasus and Turkey, shows that there are several species that have not been reported as vegetables, namely *Cirsium obvallatum*, *Crocus vallicola*, *Scilla monanthos*, and *Sempervivum minus*. Nevertheless, there are a number of wild vegetable plants in common with various areas of the Caucasus Ecoregion.

The most important species consistent with both this study's reports and more than half of the consulted literature were the following: *Anthriscus* spp. (*A. sylvestris* and *A. nemorosa*), *Chaerophyllum* spp. (*C. aureum* and *C. bulbosum*), *Heracleum* spp. (*H. sosnowskyi*, *H. trachyloma*, *H. sphondylium*, *H. antasiaticum*, and *H. platytaenium*), *Tragopogon* spp. (*T. buphthalmoides* and *T. reticulatus*), *Polygonum* spp. (*P. aviculare* and *P. cognatum*), *Rumex* spp. (*R. acetosa*, *R. acetosella*, and *R. scutatus*), *Rumex* spp. (*R. alpinus*, *R. crispus*, and *R. patientia*) (*Rumex* spp. have been divided into two groups according to their local names, ways of use, and tastes), *Urtica* spp. (*Urtica dioica*), *Chenopodium* spp. (*C. album*), and *Capsella bursa-pastoris*. Consensus on these species between our results and relevant literature is indicative of their high cultural value in the Caucasus Ecoregion.

Although two of the most popular vegetable species (*Urtica dioica* and *Rumex acetosa*) according to this study were also frequently reported previously from the Caucasus region, the most frequently cited species (*Polygonum bistorta*) in this study was earlier reported in only three studies in Turkey (Güneş & Özhatay, 2011; Kadioğlu et al., 2020; Saraç et al., 2013) and in two studies in Georgia (Bussmann, Paniagua Zambrana, Sikharulidze, Kikvidze, Darchidze, et al., 2020; Bussmann

et al., 2018). Popular soup recipes and associated collective gathering activities and festivals presented the special cultural value of *P. bistorta* for the study area. Several other important species that appear in this study are uncommon in the existing literature. Of these, the most important ones are: *Echinops* spp. (*E. pungens* and *E. sphaerocephalus*), *Sempervivum* spp. (*S. caucasicum*, *S. brevipilum*, *S. minus*, and *S. davisii* subsp. *furseorum*), *Trachystemon orientalis*, *Campanula* spp. (mainly *C. lactiflora*), *Aruncus vulgaris*, and *Crocus* spp. (*C. vallicola* and *C. suwarowianus*). Their popularity in the study area, in comparison with that in other studies, could be related to the way of life of this study's specific participants (transhumant communities) as well as their intense contact with diverse habitats such as dense forests, highlands, and high rocky places for their livestock.

Among the species mentioned above, *Campanula lactiflora* and *Aruncus vulgaris* appear to be specific to Adjara, even though they are sometimes used in the Artvin region as well. These species have similar uses and are known by the same local names in the two regions. This convergence might be related to similar forest habitats in these regions, as well as the similarity in cultural background of the communities living there.

The high popularity of *Sempervivum* in Ardahan and *Echinops* as snack vegetables in Ardahan and Samtskhe-Javakheti, but not in the other two regions, may be related to the predominance of seminomadic pastoral life in these regions. Since the consumption of raw plants in the field has been associated with mobile pastoralism (Pieroni et al., 2019), the highest number of mentioned species with dominance of consumption of raw plants as a snack in Ardahan could be related to the existence of diverse pastoral communities. In addition, having access to relatively larger agricultural lands may enable the agropastoralists of Ardahan to come into contact with diverse synanthropic plant species such as *Atriplex*, *Bunias*, *Sisymbrium*, and *Sinapis*. On the other hand, the presence of small-scale, agropastoral-based communities with vegetable home gardens, even in the highlands, might be the reason for the lower dependency on wild vegetables in Adjara. Wild plant snacks are an often an overlooked type of wild food, but more detailed wild food studies often feature them (e.g., Kaliszewska & Kołodziejska-Degórska, 2015). They are often associated with childhood, especially in areas where children play an important role in guarding grazing animals (Łuczaj & Kujawska, 2012).

Caltha palustris is usually regarded as a toxic plant and has an acrid taste when eaten unprocessed. It has been reported to be used in food several times in the relevant literature (Çakır, 2017; Kadioğlu et al., 2020; Kang et al., 2014; Pieroni et al., 2020). In the case of *Caltha*, the toxic agent is protoanemonine, which is broken down by prolonged boiling or drying (Aslam & Ijaz, 2012). The use of *Colchicum* (a genus that is also regarded as very toxic) for pickles should be investigated, as this genus is usually regarded as highly toxic.

The results of this study are yet another example of the high cultural importance of lacto-fermented foods in the Caucasus (Nanagulyan et al., 2020). The number of wild vegetables pickled in this way is higher than that recorded in the review of fermented foods of Eastern Europe (Söukand et al., 2015), according to which only cultivated vegetables are pickled in those areas.

Crocus species were the most common root vegetable species in the highlands of all four regions. In our study area, they are historically known as a signature of seasonal change and are considered indicators of oncoming cold days or snow. Their blooming calls for “the end of yayla season” or “the time to migrate down.” Before going down from the highlands to the villages, the bulbs are collected and mostly boiled or cooked in the stove, but are also sometimes eaten raw (Figure 11).

A very interesting feature of the studied food culture is a relatively long list of species whose underground organs are used as snacks. This is similar to the observations made by Pieroni et al. (2019) among Kurds. The wide use of underground organs can be seen as a very archaic cultural feature that can be practiced more easily in mountainous areas with low population density. Knowledge of edible bulbs and roots is probably of high importance to the survival of shepherds, giving them access to plant calories in seasons during which grassland geophytes are dormant.



Figure 11 (A) *Crocus* spp. are about to color the highlands in white in September in Adjara. (B) *Crocus suworowianus* is used for its edible bulb and also as “a sign of the end of yayla season,” flowering in Ardahan in September. Photos: Soner Oruç.

5. Conclusion

This study indicates a significantly diverse ethnobotanical knowledge heritage regarding wild vegetable plants among transhumant communities in the Western Lesser Caucasus. Having been in contact with various environments and with other communities for centuries has enabled these communities to create diverse knowledge. However, despite the richness of species used as vegetables, very few species are actually used by the majority of people in these communities. Knowledge of most of the species, as well as a rich local cuisine, seem to be at a risk of disappearing due to industrialization and disrupted intergenerational bonds. Publications, such as books and articles on wild edible plants and practical workshops (elders and children plant gathering and preparation tours) on wild food plants during local festivals are vital for the transmission of this knowledge to future generations. More importantly, supporting the local products of transhumant communities could help maintain this way of life.

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