



Ethnic and religious affiliations affect traditional wild plant foraging in Central Azerbaijan

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Abstract Gathering and consuming wild food plants are traditional practices in many areas of the world and their role in fostering food security has been increasingly discussed in recent years. In this field study, we focused on traditional foraging among Azeris, Tats, Russian Molokans, and Udis in Central Azerbaijan. Via 78 semi-structured interviews, with an equal number of individuals from the four ethnic/religious communities, 73 wild food folk taxa were recorded. While Caucasian autochthonous Udis have a restricted use of wild food plants in comparison with the other groups, possibly due to the fact that they live in a plains area that is horticultural-driven and well-connected, the most divergent ethnobotany was exhibited by the Tats (10 folk taxa exclusively used by them) which may be related to both their cultural and geographical isolation and the fact that this community was endogamic until only a few decades ago. Whereas the Azeri plant cultural markers are mainly retained by refugees from Karabakh, Russian Molokans, who represent a distinct, conservative ethno-religious group, seem to

have preserved a few ancient Slavic culinary uses of wild plants (*Armoracia rusticana* Gaertn., B.Mey. and Scherb., *Crataegus* spp., *Rumex acetosella* L., and especially *Viburnum opulus*). Tat cultural markers were represented by barberries (especially in their original lacto-fermented preparation) and *Ornithogalum* spp., while for Udis *Smilax excelsa* L. shoots were particularly salient, as were wild *Allium*, *Chaerophyllum*, *Prangos*, *Smyrniium*, and *Tragopogon* spp. among the Azeris. Overall, the practice of traditional foraging is alive in the Azeri Caucasus in the most remote mountainous areas and this heritage is the result of a complex co-evolution, in which both human ecological trajectories and cultural attachment to certain plant tastes have possibly shaped specific foraging patterns over centuries.

Keywords Ethnobotany · Wild food plants · Foraging · Local knowledge · Minorities · Caucasus · Azerbaijan · Plant genetic resources

Introduction

While foraging is defined in behavioral ecology as an animal's search for *wild* food resources, in human ecology it is considered an adaptive strategy, which concerns both hunter-gatherer societies and, to a lesser extent, horticulturalist and especially pastoralist communities (Sutton and Anderson 2004). Although foraging includes both wild animal and

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plant resources, most of the gathered/foraged items in the world, apart from insects and gastropods, are vegetable items.

Gathering and consuming wild food plants are traditional practices still followed in many areas of the world and their role in fostering food security has been increasingly discussed in recent years (Bharucha and Pretty 2010; Neudeck et al. 2012; Nolan and Pieroni 2014; Ong and Kim 2017; Shaheen et al. 2017; Shumsky et al. 2014).

Although the diversification of diets and their traditional ingredients (underutilized and orphan crops, wild plants, wild crop relatives, and wild meat) is considered a key issue in combating malnutrition and hunger (Heywood 2013), there is a remarkable lack of knowledge concerning the diverse aspects and scales of foraging and its effect on local communities in many areas of the world.

In Europe, especially in its southern and eastern regions, where these practices are still alive, traditional food plant gathering has been under threat since the 1960s as a result of the industrialization of local food systems, the changed social role of women within the household, and the abandonment of small-scale agro-pastoral activities (Cucinotta and Pieroni 2018; Łuczaj et al. 2012; Pieroni 2003).

On the other hand, a remarkable resilience of traditional foraging has often been described in those communities in which minor wild plant ingredients are considered crucial for shaping local cultural identities and/or for preserving health and well-being (Cucinotta and Pieroni 2018; Reyes-García et al. 2015). Additionally, these two aspects may represent not only factors that slow the decline of traditional foraging, but also, together with the new trend of eating wild foods sometimes spread by star chefs and the “return to nature” effect, real potent drivers for the resurgence of these practices (Łuczaj et al. 2012; Reyes-García et al. 2015).

The Caucasus region of Eastern Europe and, in particular, its post-communist period, have been the focus of only a few, mainly sporadic, wild food ethnobotanical studies, such as those recently conducted in Georgia (Bussmann et al. 2016, 2017; Łuczaj et al. 2017), Armenia (Hovsepian et al. 2016), and Dagestan (Kaliszewska and Kołodziejska-Degórska 2015).

We decided to focus on Azerbaijan and its traditional wild food plant gathering primarily for

three reasons: (a) the traditional gathering of wild food plants has not been systematically investigated in the country in the last few decades; (b) the country is home to remarkable linguistic and religious diversity along the Greater Caucasus Range and wild food gathering as part of the local gastronomic heritage is complex and diverse at cultural (religious/ethnic) edges (Pieroni et al. 2018); (c) the country has the lowest Global Food Security Index in Europe (GFSI 2018) and neglected food plant resources could play a role in shaping culturally appropriate food sovereignty-driven policies, which may be particularly important within the community of internal refugees (approx. one tenth of the population), who, as a consequence of the (ongoing) “frozen” war with Armenia, are particularly vulnerable in terms of food security.

The objectives of this study were therefore: (a) to record the traditional plant foraging among four linguistic, ethnic and religious communities living along the Greater Caucasus Range; (b) to compare the data among the four communities in order to point out possible differences and food *plant cultural markers* (sensu Pieroni et al. 2015: plants used and mentioned exclusively by one cultural group), as well as to compare the same data with the food ethnobotany of neighboring regions (Arab, Persian, Kurdish, and Turkish areas), and to formulate hypotheses to explain possible differences.

Materials and methods

Study area and communities

Figure 1 shows the visited villages on the southern slopes of the Greater Caucasus Range (Fig. 2).

Table 1 presents the characteristics of the selected groups. Three of the selected communities (Azeris, Tats, Udis) have been living in the study areas for many Centuries, while the Molokans arrived in the nineteenth century from Russia and the Azeri refugees from Karabakh reached the present territory approximately 30 years ago.

Field study

The field study was conducted during the spring of 2018 and the study participants were mainly selected



Fig. 1 Study area and visited villages



Fig. 2 Southern slopes of the Greater Caucasus Range

Table 1 Characteristics of the study participants

| Ethnic or ethno-religious group | Azeris | Azeri internal refugees | (Russian) Molokans | Tats | Udis |
|--|---|--|--|---|---|
| Arrival in the present area | Eleventh century AD from Central Asia (NE), when Oghuz Turks arrived in the area and mixed with the autochthonous Iranian populations | 1988 from Armenia and the Nagorno-Karabakh region (South; formally in Azerbaijan this territory is nowadays occupied by Armenian military forces within the self-proclaimed Republic of Artsakh) | 1830 from Russia (North) | Second century AD from Persia (SW) | “Autochthonous” (first mentioned in the fifth century BC) |
| Approx. number of inhabitants in Azerbaijan | 9 million | 250,000 | 2000 | 25,000 | 4000 |
| Geographical characteristics of the study villages | Mountainous | Mountainous | Hilly and mountainous | Mountainous | Plain |
| Original language | Azeri (Turkic group, non Indo-European) | Azeri (Turkic group, non Indo-European) and Kurmanji Kurdish (Iranic group, Indo-European) | Russian (Slavic group, Indo-European) | Tat (Iranic group, Indo-European) | Udi (NE Caucasian group) |
| Socio-linguistic characteristics of the study villages | Monolingual in Azeri (youngest community members); bilingual in Azeri and Russian (elderly community members) | Monolingual in Azeri (youngest community members); bilingual in Azeri and Kurmanji (elderly community members) | Mainly monolingual in Russian; some bilingual in Azeri and Russian | Bilingual in Azeri and Tat; elderly community members fluent in Russian | Bilingual in Azeri and Udi; some of the elderly community members speak Russian |
| Religion | Shia Islam | Shia and Sunni Islam | Spiritual Christianity (sect) | Shia and Sunni Islam | Orthodox Christianity (Albanian and Armenian Churches) |
| Marriages | Exogamic with other Muslims | Exogamic with other Muslims | Endogamic in the past, now partially exogamic | Endogamic in the past, currently exogamic with Muslims (Azeris) | Endogamic |
| Number of study participants | 11 | 10 | 20 | 20 | 17 |
| % of women in the sample/mean age | 18/56 | 20/62 | 60/62 | 30/54 | 29/47 |
| % of men in the sample/mean age | 82/57 | 80/38 | 40/64 | 70/49 | 71/52 |
| Overall mean age of the study participants | 57 | 50 | 63 | 52 | 50 |

among middle-aged and elderly local farmers and shepherds, who we identified as possible local knowledge holders.

Verbal consent was always obtained before each interview and the Code of Ethics of the International Society of Ethnobiology (ISE 2008) was followed. Semi-structured interviews were conducted in Russian by the second author or sometimes—especially with middle-aged and younger community members—in the Azeri language with the help of an interpreter. The interviews focused on gathered and consumed non-cultivated vegetables; wild plants used as starters in baking or yogurt making, as rennet, for preparing *sarma* (leaves rolled around a filling made from rice, aromatic herbs, and possibly meat or vegetables), or in home-made fermented products; wild fruits and other wild plants used in sweet preserves and/or liquors; wild plants used for recreational herbal teas; and mushrooms. We made note of a few unusual uses of cultivated plants as well. For each of the free-listed plant items, local names and exact details of gathering and culinary preparations were recorded.

Plants were identified using the Flora of Azerbaijan (Karjagin 1950–1961; Əsgərov 2016), while the nomenclature follows The Plant List database (2013) and family assignments are consistent with the Angiosperm Phylogeny Website (Stevens 2017). The collected voucher specimens are deposited at the Herbarium of the Department of Environmental Sciences, Informatics, and Statistics of the Ca' Foscari University of Venice, Italy (UVV, bearing herbarium numbers UVV.EB.AZ01–73). Dried plant samples were also accepted if offered by the interviewees (deposited with numbers UVV.EB.AZD01–21).

All local plant names were transcribed using the rules of the Azerbaijani (for Azeri, Tat, and Udis folk names) and Russian (for Molokan folk names) languages. We reported all Russian folk names in the Latin alphabet, using transliteration according to ISO standards (ISO 1995).

Data analysis

Data were compared with the important worldwide wild food plant reviews (Facciola 1990; Hedrick 1919; Tanaka 1976) as well as the wild food ethnobotanical studies conducted in the last three

decades in the Caucasus (see aforementioned literature) and neighboring areas: Iraqi (Pieroni et al. 2017, 2018) and Turkish (Çakır 2017; Kaval et al. 2015; Polat et al. 2015, 2017) Kurdistan, Lebanon (Marouf et al. 2015), Syria (Abdalla 2004), and Western Iran (Maassoumi and Bobrov 2004).

Results

Wild plant foods in the study area

Table 2 shows the wild food plants traditionally gathered and consumed in the study area.

For each folk taxon, we reported the botanical species and family, its folk names, the plant parts used, the exact details of its culinary preparations, and the frequency of quotation.

A small portion of the cited plants are gathered during the spring months in the vicinity of the villages (this is the case for synanthropic weeds esp. among Udis and, to less extent, Molokans), while most of the plant items are collected in pastures and mountainous areas more distant from the house. Wild vegetables are gathered by both female (rather exclusively for weeds) and male (especially for species growing further from the villages) community members, while unripe wild fruits are predominately gathered and consumed on the spot by young community members.

Considering the most extensive worldwide reviews on wild food plants and the pre-existing ethnobotanical studies conducted in the Caucasus and neighboring areas (see aforementioned literature), it is worth mentioning the following wild plant uses, since they have rarely been quoted in the scientific literature:

- *Bunium paucifolium* L. roots, presenting a hazelnut-chestnut-like taste, which are consumed raw as a snack—similar to what was done in the past in most of Western Europe with its congeneric species *B. bulbocastanum* L.;
- *Calepina irregularis*, presenting a cabbage/rocket-like, pungent-sweetish taste, whose young aerial parts are consumed raw or mainly cooked;
- *Chaerophyllum bulbosum* L. roots, presenting an aromatic, carrot-like taste, cooked—this taxon

Table 2 Non-cultivated food plants recorded among the studied communities and their local culinary uses (table also includes six cultivated plants, whose recorded culinary uses are unusual)

| Botanical taxon/taxa; family (voucher specimen codes) | Recorded local names | Parts used | Recorded gastronomic uses, frequency of quotation, and notes |
|--|---|--|---|
| <i>Allium atroviolaceum</i> Boiss.; Amaryllidaceae (AZ04, AZ23, AZ41) | Sarimsok ^T , Sir ^T , Sirçui ^T , Sirsç ^T , Soğanak ^A | Leaves ^{MA} | Seasoning <i>dovğda</i> ^{AA} , <i>kyukyü</i> ^{A,T} , <i>qutab</i> ^{A,T} , and soups ^{AA} , fermented in brine ^{A,RRR} , snack ^{A,A,T} |
| <i>Allium paradoxum</i> (M.Bieb.) G.Don; Amaryllidaceae (AZ11) | Dikij česnok ^M , Poj ^{A,M,T} | Leaves | Seasoning <i>kyukyü</i> ^{AA,MM,TT} and <i>qutab</i> ^{AA,MM,TT} , snack ^{AA,MM} |
| <i>Anthriscus caucalis</i> M.Bieb. and <i>A. sylvestris</i> (L.) Hoffm.; Apiaceae (AZ01) | Başkalın ^T , Ceme ^R , Çelambir ^A , Dah ^T , Dikaja kinza ^M , Dikaja petruška ^M | Leaves Young shoots | Seasoning <i>dovğda</i> ^{AA,MM,T} and <i>qutab</i> ^{A,M,T} , snack ^A . T Fermented in brine ^{RRR} |
| <i>Arctium lappa</i> L.; Asteraceae (GR22) | Çortun ^R , Lopuh ^M | Roots | Boiled ^R , snack ^R , soups ^M |
| <i>Armoracia rusticana</i> P.Gaertn., B.Mey. and Scherb.; Brassicaceae (AZ094) | Hren ^{M,R} | Roots ^{MA} | Seasoning cold dishes ^{R,MMM} |
| <i>Artemisia absinthium</i> L.; Asteraceae [#] | Polyn ^M | Leaves | Snack ^M |
| <i>Asparagus verticillatus</i> L.; Asparagaceae (AZ14) | Guvançar ^U , Kalanča ^U , Kulancar ^A , R, Spazza ^M | Young shoots ^{MA} | Boiled and fried with eggs ^{AA,MM,RR,UU} , <i>qutab</i> ^{MM} |
| <i>Berberis vulgaris</i> L.; Berberidaceae [#] | Kislička ^M , Sum ^T , Ziriş ^{A,T} , Zirişk ^T | Fruits ^{MA} | Added to cooked rice ^T , fermented in brine (and esp. used to dress onions) ^{A,M,TTT} , sweet preserves and <i>kompot</i> ^{TT} |
| <i>Bunium paucifolium</i> DC.; Apiaceae (AZ39) | Buzluçok ^M , Kaştanik ^M , Şabil ^{A,T} , Zemnoj oreh ^M | Roots | Snack ^{A,T,MM} |
| <i>Capsella bursa-pastoris</i> (L.) Medik.; Brassicaceae (AZ12, AZ24) | Gaguluğuşin ^T , Kaşka ^M , Kogolla ^T , Quşəppəyi ^{A,R,T} , Pilpilaç ^T | Leaves | Cooked and then fermented in brine ^A , <i>dovğda</i> ^T , <i>kyukyü</i> ^T , <i>qutab</i> ^{AA,R,TTT} , soups ^{AA} |
| <i>Calepina irregularis</i> (Asso) Thell.; Brassicaceae (AZ19) | Pałcum ^A | Young whorls | <i>Dovğda</i> ^A , <i>kyukyü</i> ^A , <i>qutab</i> ^A , snack ^A |
| <i>Chaerophyllum bulbosum</i> L. (AZ06); Apiaceae | Cacix ^A | Hypocotyl tubers and lower part of the stems | Tubers: cooked like potatoes ^{AA} Stems: <i>dovğda</i> ^A , <i>qutab</i> ^A , snack ^{AA} |
| <i>Chenopodium album</i> L.; Amaranthaceae (GR18) | Davun ^U , Lebeda ^M , Tərs ^{A,T} | Aerial parts | Boiled and <i>kyukyü</i> ^{UUU} , <i>qutab</i> ^T , soups ^{A,M,T} |
| <i>Cirsium echinus</i> (M.Bieb.) Hand. Mazz. and <i>C. macrocephalum</i> C.A.Mey.; Asteraceae (AZ57, AZ10) | Kangal ^A , R, U, Şelal ^T | Stems Seeds | Pealed and eaten raw ^{AA,RR,TT,U} Snack ^U |
| <i>Cornus mas</i> L.; Cornaceae [#] | Kizil ^M , Zoğal ^{R,T,U} | Fruits ^{MA} | Distilled into spirits ^{M,R,U} , fermented in brine ^M , sweet preserves and <i>kompot</i> ^{MMM,TT,U} |
| <i>Corylus avellana</i> L.; Betulaceae [#] | Ərək ^U | Leaves ^{MA} | <i>Sarma</i> ^U |
| <i>Cotoneaster melanocarpus</i> Fisch.ex Blytt.; Rosaceae (AZ056) | Çahabisim ^T | Fruits | Snack ^T |

Table 2 continued

| Botanical taxon/taxa; family (voucher specimen codes) | Recorded local names | Parts used | Recorded gastronomic uses, frequency of quotation, and notes |
|---|---|---|---|
| <i>Crataegus pentagyna</i> Waldst. and Kit. ex Willd. and possibly other <i>C.</i> species; Rosaceae (AZ60, AZD02) | Bojaryşnik ^M , Glamatsoi ^U , Kenek ^U , Şyşki ^M , Yemişan ^{A,T,U} , Zerit ^T | Fruits ^{MA} Flowering aerial parts ^{MA} | <i>Kulaga</i> ^M , recreational tea (fruits) ^A (aerial parts) ^M , snack ^{A,M,U} , sweet pies ^M , sweet preserves and <i>kompot</i> ^{MM,TT} |
| <i>Crepis pulchra</i> L. and <i>C. foetida</i> subsp. <i>rheoadifolia</i> (M.Bieb.) Čelak.; Asteraceae (AZ20, AZ45) | Çobançareie ^A , Turşan ^T | Stems | Snack ^{A,T} |
| <i>Crocus speciosus</i> M.Bieb.; Iridaceae (AZ42) | Pervocvet ^M , Qusuğöse ^T | Bulbs | Boiled and eaten like potatoes ^T , (raw) snack ^M |
| <i>Cydonia oblonga</i> Mill.*; Rosaceae | Aıva dikaja ^M , Bih ^T , Heyva ^{R,T} , Pusha ^U | Leaves Flower petals Fruits ^{MA} | Sarma ^{R,TTT} Snack ^U Sweet preserves and <i>kompot</i> ^M |
| <i>Elaeagnus rhamnoides</i> (L.) A.Nelson; Elaeagnaceae (AZ68) | Galebizim ^T , Karsum ^T , Oblepixa ^M | Fruits ^{MA} | Sweet preserves and <i>kompot</i> ^{MM,TT} |
| <i>Epilobium angustifolium</i> L.; Onagraceae [#] | Ivan čaj ^M | Leaves | Recreational tea ^M |
| <i>Fagus orientalis</i> Lipsky; Fagaceae [#] | Lapan ^U , Pip ^{A,R,T} | Leaves ^{MA} | Sarma ^{AA,RR,TTT,UU} |
| <i>Falcaria vulgaris</i> Bernh.; Apiaceae (AZ07) | Qazayağave ^A | Aerial parts ^{MA} | Raw snack ^A |
| <i>Filipendula vulgaris</i> Moench; Rosaceae [#] | Karnal ^T , Koincose ^A , Şabil ^{T,A} | Shoots and roots | Snack ^{A,T} |
| <i>Fragaria vesca</i> L.; Rosaceae [#] | Hamy ^U , Muri ^T , Zemljanika ^M | Fruits ^{MA} | Snack ^{MM} (rarely in the past, common today),T,U |
| <i>Heracleum trachyloma</i> Fisch. and C. A. Mey.; Apiaceae (AZ66) | Baldarğan ^T , Baldırgan ^{A,R} , Caldarğan ^T , Candaloş ^T , Gandaloş ^T , Kapury ^M , Malaçun ^R , Xarapenç ^T | Stem ^{MA} | Fermented in brine ^{AAA,RRR,TT} , snack ^{AAA,MM} (“makes you drunk if consumed in large amounts”) |
| <i>Humulus lupulus</i> L.; Cannabaceae (GR15) | Cindireh ^U , Hmel ^M | Shoots Female inflorescences | Fried ^{UU} <i>Drodzy</i> ^M (very commonly used in the past, today rare) |
| <i>Hypericum perforatum</i> L.; Hypericaceae [#] | Şimsit ^T , Zverboj ^M | Aerial parts | Recreational tea ^{M,T} |
| <i>Malus baccata</i> (L.) Borkh.; Rosaceae (AZ51) | Almu ^T , Arma ^T , Camatalataze ^T , Jabloki dikie ^M , Məşədə ^K , Sif ^T | Fruits | Fermented in brine ^{M,T} , recreational teas (after being dried) ^M , snack ^{RR} , sweet preserves and <i>kompot</i> ^{M,TT} |
| <i>Malva neglecta</i> Wallr. and <i>M. sylvestris</i> L.; Malvaceae (AZ38, AZ29) | Alteika ^M , Amaçedoumağə ^R , Emeçumeğə ^A , Əməkimeçə ^R , Pipilac ^T , Pumpul ^U , Pyşçnik ^M , Pyşnik ^M , Tolkr ^R | Leaves | Fried ^M , salad ^M , <i>qutab</i> ^{A,RR,M,TT} , <i>sarma</i> ^{A,TTT} , soups ^{AA,U} , <i>dovğa</i> ^{A,RR,MM,TT} , green <i>borscht</i> ^{MM} |
| <i>Mentha × piperita</i> L. and <i>M. spicata</i> L.; Lamiaceae (AZ05, AZD03)** | Mjata ^M , Nanə ^{A,R} , Nanüt ^T | Aerial parts ^{MA} | Dried and fresh seasoning for <i>dovğa</i> ^{AA,RR,TT} , recreational tea ^{AA,M,TT} , <i>qutab</i> ^{RR,TT} seasoning <i>pilaf</i> , cheese, and <i>sarma</i> ^{RR} , <i>qutab</i> ^{TT} |
| <i>Mentha longifolia</i> (L.) L.; Lamiaceae (AZ16, AZ27, AZ44) | Mjata ozernaja ^M , Purinat ^T , Yarpəz ^{A,R,T} | Aerial parts | Dried and fresh seasoning for <i>dovğa</i> ^{AA,RR,TT} , recreational tea ^{AA,M,TT} , <i>qutab</i> ^{RR,TT} seasoning <i>pilaf</i> , cheese, and <i>sarma</i> ^{RR} , <i>qutab</i> ^{TT} |

Table 2 continued

| Botanical taxon/taxa; family (voucher specimen codes) | Recorded local names | Parts used | Recorded gastronomic uses, frequency of quotation, and notes |
|--|---|--------------------------------------|--|
| <i>Mespilus germanica</i> L. Rosaceae (AZ55) | Azcil ^T | Fruits ^{MA} | Fermented in brine ^T , sweet preserves and <i>kompot</i> ^T |
| <i>Morus alba</i> L.; Moraceae** | Tut ^{A,R,U} | Fruits ^{MA} Leaves | Distilled into spirits ^{A,RR,U} , <i>pekmez</i> ^A , snack ^R |
| <i>Oenanthe pimpinelloides</i> L.; Apiaceae (AZ26) | Horcote ^A | Basal rosettes | <i>Qutab</i> ^A |
| <i>Ornithogalum ponticum</i> Zahar.; Asparagaceae [#] | Gojuncest ^T , Kuseğuse ^T | Aerial parts and bulbs | Boiled in milk ^T , <i>qutab</i> ^T |
| <i>Papaver orientale</i> L.# and <i>P. rhoeas</i> L.; Papaveraceae (AZ09) | Alola ^T , Alulaç ^T , Lalə ^{A,R,T} , Mak dikij ^M | Young aerial parts | Boiled ^{AAA} , <i>kyukyl</i> ^{AA,M} , raw snack ^{A,M} , <i>qutab</i> ^{AA} , <i>RR,TT</i> , <i>doğça</i> ^{A,M,TT} Garnishing bread ^T |
| <i>Phaseolus vulgaris</i> L.*; Fabaceae | Lubye ^T | Leaves | <i>Sarma</i> ^T |
| <i>Pimpinella aromatica</i> M.Bieb.; Apiaceae (AZD05) | Tuntuma ^T | Seeds | Seasoning bread ^T |
| <i>Plantago major</i> L.; Plantaginaceae (AZ22) | Bağalbağ ^T , Bağayarpağ ^A , Kergəpugum ^R , Podoroznik ^M | Leaves | Fermented in brine ^R , <i>qutab</i> ^A , recreational tea ^T , salad ^M , snack ^R , <i>sarma</i> ^{A,T} |
| <i>Podospermum canum</i> C.A. Mey.; Asteraceae [#] | Kasmatki ^M | Leaves, stems | Salad ^(in the past during times of famine) ^M , snack ^M |
| <i>Polygonum cognatum</i> Meisn.; Polygonaceae (AZ50) | Çarceuo ^T | Leaves | <i>Doğça</i> ^T , <i>qutab</i> ^T |
| <i>Portulaca oleracea</i> L. Portulacaceae (GR04) | Kaprica ^M , Tentor ^U | Aerial parts ^{MA} | Boiled ^{UU} , fermented in brine ^{M,UU} , salads ^{UU} |
| <i>Prangos ferulacea</i> (L.) Lindl.; Apiaceae (AZ35) | Çaşınır ^R , Çeşer ^R , İlançolğasi ^T , Kapury ^M | Aerial parts ^{MA} | Boiled and then fermented in brine ^{M,RRR,T} |
| <i>Primula woronowii</i> Losinsk.; Primulaceae (AZ28) | Baraški ^M , Baranćiki ^M , Babuškinj rubahi ^M | Leaves | Salad ^M |
| <i>Prunus cerasifera</i> Ehrh.; Rosaceae (AZ59) | Alisa ^A , Alyça ^M , Gox ^U , Turshi ^T | Unripe and ripe fruits ^{MA} | Unripe fruits: fermented in brine ^{A,T} , snack ^A , soups ^A Ripe fruits: distilled into spirits ^U , pies ^M , salty ^M or sweet ^{M,T} preserves and <i>kompot</i> ^M , snack ^M |
| <i>Prunus cerasus</i> L.; Rosaceae [#] | Zurcoem ^T | Fruits ^{MA} | Fermented in brine ^T |
| <i>Prunus spinosa</i> L.; Rosaceae (AZD06) | Lesnoj ijom ^M , Tèren ^M , Dikij tjoren ^M | Fruits ^{MA} | Distilled into spirits ^{MM} , dried and then boiled ^M , preserved without sugar, previously burried in vessels underground ^{MMM} |
| <i>Pyrus caucasica</i> Fed. and <i>P. salicifolia</i> Pall.; Rosaceae (AZ46; AZ89) | Gruşy dikie ^M , Karibə ^T , Meşar ^R , Zimovki ^M | Fruits ^{MA} | Distilled into spirits ^{RR} , fermented in brine ^{RR} , <i>kulaga</i> ^M , snack (raw and dried) ^{MM,RR,T} , sweet preserves and <i>kompot</i> ^M |

Table 2 continued

| Botanical taxon/taxa; family (voucher specimen codes) | Recorded local names | Parts used | Recorded gastronomic uses, frequency of quotation, and notes |
|--|--|--|---|
| <i>Rosa canina</i> L. and <i>Rosa</i> spp.; Rosaceae (AZD01, AZ40, AZ63) | Çengil ^T , Dikij şipovnik ^M , Itburne ^U | Fruits ^{MA} , Roots Flower petals (<i>Rosa</i> spp.) ^{MA} | Recreational tea ^{A,MMM,TTT,U} , snack ^{UU} , sweet preserves and <i>kompot</i> ^{A,TT,UUU} Recreational tea ^M Recreational tea ^A |
| <i>Rubus caucasicus</i> Focke; Rosaceae (AZ64) | Balnhoi ^U , Barçan ^A , Ježevika ^M , Ozna ^M , Peğala ^T | Fruits ^{MA} Young stem | Sweet preserves and <i>kompot</i> ^{A,MM,T,U} Raw snack ^{MA} |
| <i>Rubus idaeus</i> L.; Rosaceae [#] | Burtçan ^T | Fruits ^{MA} | Snack ^T |
| <i>Rumex acetosa</i> L. (AZ31, AZ54) and <i>R. acetosella</i> L. (AZ02); Polygonaceae | Fitoli ^T , Futolxə ^T , Gusugulag ^K , Şcəvel ^M , Tabalu ^T , Turşat ^T , Turşanç ^T , Turtuncik ^U , Xialo ^T | Leaves and stems ^{MA} | Boiled and then <i>kyukyur</i> ^R , <i>dovğad</i> ^M , fermented in brine ^T , green <i>borscht</i> ^{MMM,U} , <i>pilaf</i> ^M , <i>qutab</i> ^A , salad ^M , snack ^{A,R,U} , soups ^T , sweet pies (strawberry-like smell) ^{MMM} |
| <i>Rumex conglomeratus</i> Murray (AZ43), <i>R. cofertus</i> Willd. (AZ37), <i>R. crispus</i> L. (AZ32), <i>R. obtusifolius</i> L. (AZ15), and <i>R. patientia</i> L. (AZ21); Polygonaceae | Avaliç ^R , Əvəlik ^{A,R,U,T} , Kisily ^M , Kicakazal ^U , Şcəvel ^T , Konskij ^M | Leaves ^{MA} | Green <i>borscht</i> ^{MM} , <i>kyukyur</i> ^T , fermented in brine ^T , <i>dovğad</i> ^{AAA,MM,RR,TTT} , <i>qutab</i> ^{AAA,RR,T,U} , <i>pilaf</i> ^{AAA,RR,TTT} , <i>sarmad</i> ^{R,T} |
| <i>Silybum marianum</i> (L.) Gaertn.; Asteraceae (AZ34) | Kangal ^{R,U} , Şelal ^T | Stems ^{MA} | Fermented in brine ^{T,U} , snack ^R |
| <i>Smilax excelsa</i> L.; Smilacaceae (AZ56) | Çöretsat ^U , Oratsats ^U | Shoots | Boiled (possibly mixed with garlic and accompanied with spirits) ^{UU} |
| <i>Smymnium perfoliatum</i> L.; Apiaceae [#] | Şoşan ^R | Shoots | Fermented in brine ^{RRR} |
| <i>Sorbus caucasica</i> Zinserl.; Rosaceae (AZ72) | Pungul ^T | Fruits | Snack ^T , sweet preserves ^T |
| <i>Stellaria media</i> (L.) Vill.; Caryophyllaceae (AZ08) | Cincilin ^{A,R,T} , Zinzilin ^{R,T} | Aerial parts | Fried ^A , <i>dovğad</i> ^{AAA,TTT} , <i>kyukyur</i> ^{TTT} , <i>qutab</i> ^{A,R,TTT} , soups ^A |
| <i>Taraxacum campyloides</i> G.E.Haglund; Asteraceae [#] | Oduvançik ^M | Leaves Flowers | Coffee substitute ^M , green <i>borscht</i> ^M Sweet preserves ^M |
| <i>Thymus caucasicus</i> Willd. Ex Benth. (AZD08), <i>T. collinus</i> Bieb. (AZD07), and <i>Thymus transcaucasicus</i> Romniger (AZ62); Lamiaceae | Atotur ^R , Çebrets ^M , Merzaju ^T , Purinat ^T , Tazal ^T , Tsaklotu ^{A,R} | Aerial parts ^{MA} | Recreational tea ^{AAA,MM,RR,TT} , seasoning for grilled meat and <i>dovğad</i> ^T |
| <i>Tragopogon graminifolius</i> DC. and <i>T. reticulatus</i> Boiss. & A.Huet; Asteraceae (AZ25, AZ03) | Şing ^T , Yemliş ^A | Shoots | <i>Qutab</i> ^A , snack ^{AA,T} |
| <i>Trifolium pratense</i> L.; Fabaceae (AZ73) | Ç-əçələzote ^T | Flowers | Recreational tea ^T |
| <i>Triticum aestivum</i> L.*; Poaceae | Buğda ^A , Gundm ^T | Germinated young shoots | Decocted; the resulting decoction is used for (dyeing) preparing a special, home-made green <i>halva</i> that is consumed during the Nowruz Festivities (21 st March) ^{AA,TT} |

Table 2 continued

| Botanical taxon/taxa; family (voucher specimen codes) | Recorded local names | Parts used | Recorded gastronomic uses, frequency of quotation, and notes |
|---|--|-----------------------|--|
| <i>Tussilago farfara</i> L.; Asteraceae (AZD12) | Çurki ^R , Karpeğan ^R , Kipeğan ^R , Sarmajapağ ^R | Leaves | Kyukyul ^R , dovğa ^R , sarma ^R |
| Unidentified Apiaceae sp. | Poskal ^U | Roots | Snack ^U |
| Unidentified Apiaceae sp. | Svinuška ^M | Stems | Snack (with salt) ^M |
| Unidentified Brassicaceae sp. (AZ19) | Paļčum ^A | Young shoots | Dovğa ^A , kyukyul ^A , qutab ^A , snack ^A |
| <i>Urtica dioica</i> L.; Urticaceae (AZ17) | Cezina ^T , Gicitkan ^{A,R,T} , Karpeğan ^R , Kizilçan ^{A,R} , Kipeğan ^R , Krapiva ^M , Gişçan ^A , Meç ^U , Zi ^A | Young aerial parts | Afar ^{UU} , boiled ^{M,R} , green <i>borscht</i> ^{MM} , fried with onions and/or eggs ^{AAA,MM,TT,UU} , <i>qutab</i> ^{RR, UU} , rubbed with salt and eaten on bread ^T , soups ^A |
| <i>Viburnum opulus</i> L.; Viburnaceae [#] | Kalina ^M | Fruits ^{MA} | Dried or stored in water for winter and then recreational tea ^{MMM} , <i>kalimiki</i> ^M (very common in the past), <i>kulaga</i> ^{MM} , snack ^M |
| <i>Viola odorata</i> L.; Violaceae (AZ48) | Banofşa ^T , Konfety ^M | Flowers ^{MA} | Snack ^M Recreational tea (also used as an anti-fever) ^T |
| <i>Vitis vinifera</i> L.**; Vitaceae | Andrus ^T , Hazal ^U , Tull ^U , Vinograd ^M , Üzüml ^{RR,T} | Leaves ^{MA} | Sarma ^{M,RR,UU,TT} |

^A recorded among Azeris; ^M recorded among (Russian speaking) Molokans; ^R recorded among Azeri internal refugees from Karabakh (mainly Kurds); ^T recorded among Tats; ^U recorded among Udis

*Cultivated taxon (whose recorded folk culinary use is “unusual”); ** both wild and cultivated

Taxon identification made via detailed plant descriptions and previously recorded folk names

Frequency of quotation: x less than 20%, xx 20–50%; xxx more than 50%

Plants part(s): ^{MA} occurring on local markets

Gastronomic uses. *Afar*: typical Caucasian relish (known as *phthali* in Georgia) made from chopped greens or other vegetables mixed with ground onions, garlic, walnuts, and aromatic herbs; *borscht*: typical Eastern Slavic sour soup; *harva*: sweet Middle Eastern confection made from flour, butter, sugar, and possibly nuts; *kalimiki*: Eastern Slavic sweet pie made with *Viburnum opulus* berries and traditionally consumed at Easter; *kompot*: Slavic beverage obtained by boiling fruits with a large amount of water, often together with raisins (different from the Western European *compote* in a small amount of sugar used); *kulaga*: Slavic sweet soups made with germinated wheat (ground and poured over with boiling water), berries, and flour (finished in the oven); *dovğa*: typical Azeri yogurt-and-herb based soups; *drodzy*: home-made yeast made by mixing a decoction of hop inflorescence with bran, shaped by hand into small oval balls, and preserved in dried form (see Fig. 5); *kyukyul*: typical Azeri and NE Iranian vegetable omelette; *pilaf*: Oriental dish made from boiled saffron rice, and, in Azerbaijan, *gara* (cooked meat, eggs, dried fruits, or fish), and aromatic herbs; *pekmez*: typical syrup of Ottoman cuisine obtained by condensing diverse fruit juices; *qutab*: typical Azeri thin stuffed (salty) pancake filled with mixtures of aromatic and wild herbs, or cheese, or meat; *sarma*: leaves rolled around a filling made from rice, aromatic herbs, and possibly meat or vegetables

Traditional medical and folk uses of the culinary plants described here are given for informational purposes only. Medicinal use of plants should be carried out only under the care of a well-informed, qualified physician. Please also note that some species included in this table may be poisonous, and others may cause toxic reactions in susceptible individuals. Although most, if not all culinary plants are pharmacologically active, for many herbs limited health information is available, and long-term effects of regular consumption are still scarcely investigated



Fig. 3 *Falcaria vulgaris* leaves gathered in the village of Kürdüvan

was widely used in Central and Eastern Europe in the past;

- *Fagus orientalis* Lipsky leaves, having a slight astringent taste, used for preparing *sarma*—this is a very specific Caucasian custom, and the resulting *sarma* is delightfully astringent (and also *umami*

as the result of the meat-based filling and being cooked in broth);

- *Falcaria vulgaris* Bernh. (Fig. 3), which has a very aromatic taste, whose young aerial parts are consumed cooked—its use in the kitchen is still present in Eastern Turkey;
- *Heracleum trachyloma* Fisch. stems, slightly aromatic, lacto-fermented (Fig. 4) or consumed raw—a very widespread Azeri custom, which we also recored as common among Tats and Molokans, that may have ties to the Persian tradition of using this plant, particularly the dried fruits (*golper*), widely used in the Iranian cuisine as a seasoning (Duguid 2016);
- *Humulus lupulus* L. female inflorescences, mixed with bran (Fig. 5), as home-made yeast for bread (only among Molokans); this use of hops was recorded in the nineteenth century in some areas of Eastern Europe (Maurizio 1927) and until the first half of the twentieth century in Eastern Romania (Pieroni et al. 2012);
- *Pimpinella aromatica* M.Bieb. fruits, very aromatic, resembling anise and caraway, used as seasoning by Tats;
- *Polygonum cognatum* Meisn. leaves, presenting a neutral taste, cooked;
- *Prangos ferulacea* (L.) Lindl. shoots, having a very aromatic taste vaguely resembling that of sea



Fig. 4 Lacto-fermented *Prangos* and *Heracleum* spp. stems prepared in an Azeri refugees' household of Pirdinar



Fig. 5 Bread “yeast” made with a decoction of *Humulus lupulus* inflorescences and bran in a Molokan household of Xilmilli

fennel (*Crithmum maritimum* L.), lacto-fermented in brine (Fig. 4) exclusively among Azeri refugees from Karabakh;

- *Smyrniium perfoliatum* L. stems, aromatic, lacto-fermented among Azeri refugees—the plant is also very commonly used in Kurdistan;
- *Primula woronowii* Losinsk. leaves, whose taste is neutral, used raw in salads exclusively by Molokans, although according to our interviewees this use seems to have been only recently established.

Most of the plants are exclusively used within households, while a few of them (see Table 2, most notably *Asparagus* and *Silybum* spp., Fig. 6) are also

sold in markets or along the main roads during the spring, while others are preserved (mainly lacto-fermented in brine or in sweet preserves) and sold in local markets (taxa indicated by ^{MA} in Table 2). Although a quantitative analysis of the economic impact of foraging was not the main aim of our study, our observations suggest that the small-scale market of these wild vegetables can generate income, which may be crucial in disadvantaged households.

All the visited communities, especially those inhabiting the most remote mountain villages, consider gathering and consuming wild plants an important cultural custom and these practices still represent a daily routine during the spring, and, to a lesser extent, the summer (for a few wild fruits only) and the first part of autumn. The study participants often promote the advantages of consuming wild food ingredients via a narrative that includes two main arguments. First is their widespread availability, which in spring would precede that of cultivate plants thus ensuring them a food supply during a critical period, when it could be difficult to find alternatives, considering the distance of a few mountain villages to the nearest towns having a market or supermarket (up to 3 h drive with off-road vehicles). The second is the perceived health-promoting effects of their consumption.

The knowledge in the most remote villages is also shared by the youngest community members, while



Fig. 6 *Silybum marianum* stems sold along a main road close to the town of Şamaxı

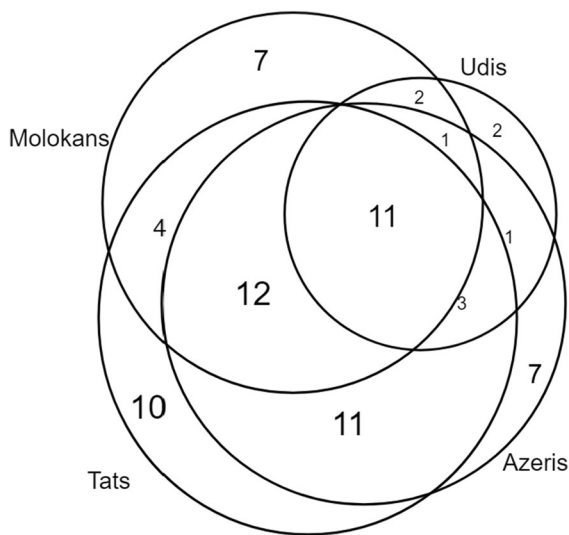
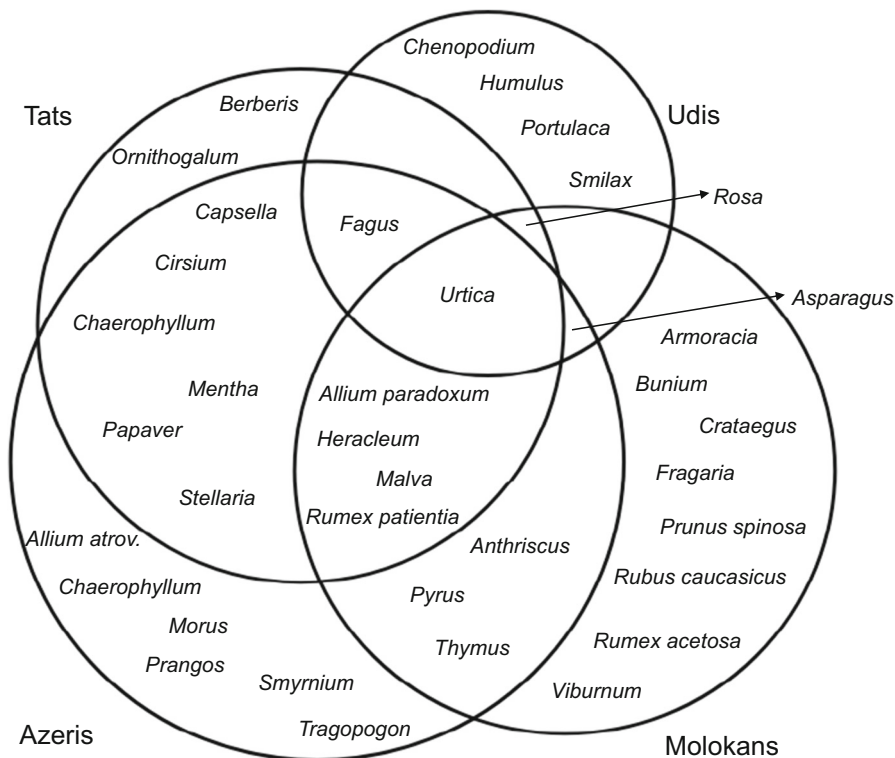


Fig. 7 Venn diagram showing the overlap among the four studied communities for the recorded wild food plants

in villages that are closer to towns, wild food plant knowledge holders are elderly people only.

While Table 2 reports also a few cultivated taxa (*Cydonia*, *Mentha*, *Morus*, *Phaseolus*, *Triticum* and *Vitis* spp.) used in “unconventional” ways, which

Fig. 8 Venn diagram showing the overlap of the recorded wild food plant genera/species among the four studied communities for the most commonly quoted taxa only. The figure does not show *Eleagnus*, which represents the overlap between Tats and Molokans



diverge from usual, regional or “globalized” food utilizations, it is worth to mention that we could observe in a few home-gardens the incipient domestication of *Heracleum trachyloma*, whose stems are highly appreciated as lacto-fermented pickles among Azeris and Tats.

Comparison among the studied communities

Figures 7 and 8 present two Venn diagrams showing the overlap among the four studied communities (number of cited folk taxa and most commonly quoted genera/taxa only, respectively).

Udis seem to have a restricted use of wild food plants in comparison with the other groups, possibly due to the fact that they live in a plain area, where living conditions are less difficult and food security in spring less problematic. Moreover, they commonly use synanthropic, post-Neolithic weedy food plants such as *Chenopodium* and *Portulaca* spp., which seem to be ignored by the other communities.

The most divergent ethnobotany, however, is shown by the Tats (12 folk taxa exclusively used by them, of which only two are commonly used, see Figs. 8 and 9), which may be related to their cultural

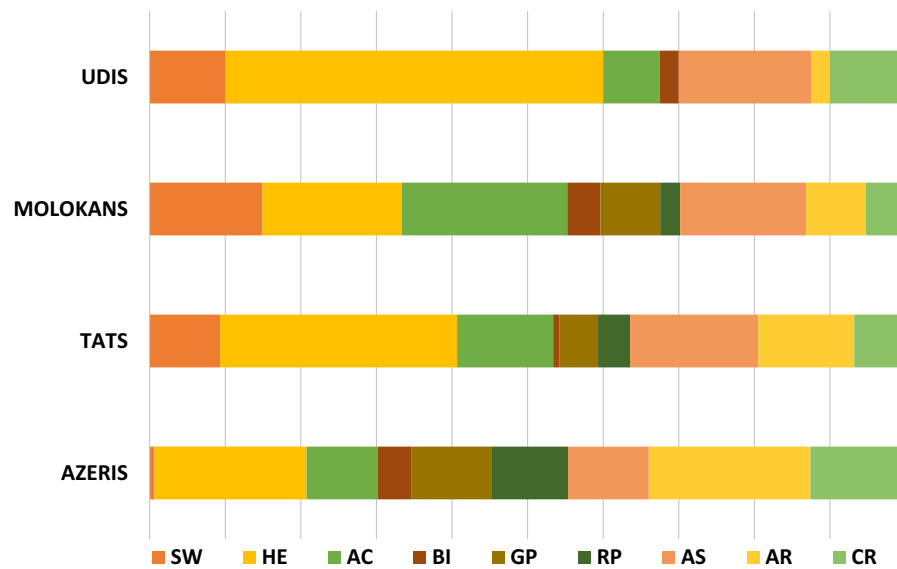


Fig. 9 Sensory fingerprint of the wild plant foods quoted by the studied communities (*SW* sweet taste, *HE* herbaceous/neutral taste, *AC* acidic taste, *BI* bitter taste, *GP* garlic-like pungent taste, *RP* rocket-like pungent taste, *AS* astringent taste, *AR* aromatic taste, *CR* crunchy texture)

and geographical isolation. In fact, this community was endogamic until only a few decades ago, despite the fact that they have partially shared the same religious faith with the dominant group (Azeri), although they have retained a completely different language (Iranic Tat vs. Turkic Azeri). Moreover, in our study area Tats live in the most remote mountain villages, which could have historically enhanced isolation and the permanence of ancient local knowledge regarding wild food plants.

With regard to the plant *reports* (i.e. food uses of the different species), Azeris and Molokans also show important divergences, which is exemplified by the latter group, which retains eight species, commonly used only by them, that we may define as *plant cultural markers* (sensu Pieroni et al. 2015). This could be attributed to the historical ethno-religious trajectory of Molokans, who were historically endogamic and lived fully separated from the other groups, although during Communists times mixed marriages among different ethnic/religious groups were not uncommon in the study area, as atheism was the norm in the public sphere. However, Molokans have the most in common with Azeris despite differences in both faith and language, which may be due to the inevitable *azerization* process that all ethnic and linguistic minorities in Azerbaijan have experienced for centuries. The reasons for this

process may be diverse: (a) the Azeri language acted as a lingua-franca in the Eastern Caucasus from the sixteenth to the twentieth century (Trubetzkoy 2000); (b) Azeri culture/language was dominant in the school system and the media in the study area during the last century (former Soviet Socialist Republic of Azerbaijan from 1936 to 1991, and since then independent Azerbaijan); (c) no pure Molokan villages still exist in the study area, rather Molokan families are spread across villages mainly inhabited by Azeri families—this does not happen for Udis and, to a lesser extent, Tats, which still live in separate, mono-ethnic villages.

While a remarkable number of wild food plants (six) are shared by Tats and Azeris, the Azeri plant cultural markers are mainly retained by Azeri refugees from Karabakh, which have a fairly different ethnobotany from that of the autochthonous, local Azeri population. This may be due to the different regional customs from their place of origin (Karabakh high mountains vs. the present area where they live in Central Azerbaijan), their complex ethnic roots (they were originally mainly Sunni Kurds, strongly *azerized* in the course of history), and especially their current economic and social marginalization, which has forced them to live at the edge of the communities we visited, with very limited socio-economic resources.

Green culinary fingerprints

Figure 9 illustrates the sensory fingerprints concerning the taste of the recorded wild food plants consumed in each community. The diagram was created using the sensory characteristics of all recorded wild plant parts (as described by the interviewees), as well as their quotation indexes. Moreover, the fingerprints were designed by considering nine sensory categories:

1. sweet taste (exemplar: ripe strawberries, *Fragaria vesca* L., Rosaceae; code SW);
2. herbaceous/neutral taste (exemplar: fat hen, *Chenopodium album* L., Amaranthaceae; code: HE);
3. acidic taste (exemplar: sorrel, *Rumex acetosella*, Polygonaceae, code: AC);
4. bitter taste (exemplar: dandelion, *Taraxacum campyloides* G.E.Haglund, Asteraceae; code: BD);
5. garlic-like pungent taste (exemplar: wild garlic, *Allium* spp.; code GP);
6. rocket-like pungent taste (exemplar: shepherd's purse, *Capsella bursa-pastoris* (L.) Medik., Brassicaceae; code RP);
7. astringent taste (exemplar: unripe sour cherries, *Prunus cerasus* L., Rosaceae; code AS);
8. aromatic taste [exemplar: wild chervil, *Anthriscus caucalis* M.Bieb. (Fig. 10), Apiaceae and mint, *Mentha* spp.; code: AR];



Fig. 10 Lacto-fermented *Anthriscus caucalis* stems prepared in an Azeri refugees' household of Meyseri

9. crunchy texture (exemplar: fresh stems of milk thistle, *Silybum marianum* (L.) Gaertn., Asteraceae; code CR).

The figure shows how Azeris and, to a lesser extent, Tats, seem to favor wild plants having crunchy and aromatic tastes/textures, mainly represented by wild greens, and often Apiaceae snacks, thus reinforcing the hypothesis that among these two groups “pastoralist snacks” have shaped a large part of their foraging behavior. “Pastoralist snacks” are green plant parts, mainly internal stems or flower receptacles, gathered and processed using a knife, consumed as it is, mainly on-spot, or sometimes at home just dipped in salt, possibly originally adopted by shepherds as a side activity while leading herds to grazing areas.

On the other hand, the prevalence of bitter, acidic, and sweet tastes among Molokans could be partially interpreted as a more important attachment to the horticultural practice of gathering synanthropic, mainly Asteraceae, bitter weeds and to specific culinary processes as well (lacto-fermentation, which generates sour taste; and sweet preserves). The fact that the importance of pungent Amaryllidaceae (belonging to the former Liliaceae s.l. family) and Brassicaceae herbs (garlic- and rocket-like, respectively) decrease from Azeris to Tats, and especially among Molokans and Udis, could also be related to a more limited exposure the first two groups have had to industrial foods and mainstream cultivated vegetables living in more isolated villages.

Overall, the relative modest contribution to the diet provided by bitter tasting wild plants suggests that the distance of the Caucasian foraging we observed in Central Azerbaijan from the horticulturalist post-Neolithic nutritional framework of the Fertile Crescent, and in particular from Middle Eastern farming communities (Assyrians), which moved in ancient times westward toward Greece and the Central Mediterranean, created what we have referred to for several decades as the “Mediterranean Diet” (Cucinotta and Pieroni 2018; Pieroni et al. 2018; Pieroni and Cattero 2019).

Figure 11 shows the predominant botanical families of the recorded wild food preparations consumed by the four studied communities and considers the frequency of quotation of each of them as well. The figure illustrates how the aforementioned sensory

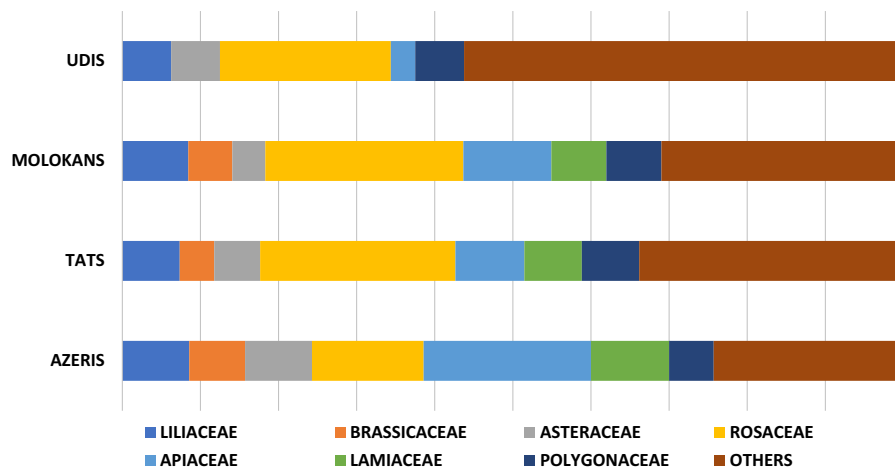


Fig. 11 Most frequently quoted wild food botanical families among the studied communities

fingerprints are only partially rooted in the cultural salience of certain botanical families and consequently the foraging ecology/foodscapes of the communities. It is remarkable to note only a single significant difference: a large predominance of Apiaceae species (responsible for most aromatic tastes) among Azeris, in whose cluster Rosaceae is not very relevant. This would confirm that both families represent reservoirs of mainly non-synanthropic plants, which agrees with the human ecological pastoralist origin of the Azeris. However, the absence of other important differences may suggest that the ecology of wild plant gathering areas, i.e. the possible human ecological historical trajectory of the studied communities, may represent only one of the different elements that have influenced their foraging patterns. In particular, our data also suggest that a possible different cultural attachment toward specific plant tastes may have played a crucial role in influencing the foraging preferences of the studied ethnic groups.

Comparison with the ethnobotanical literature of neighboring regions

On the basis of the comparative analyses we conducted in the previous paragraphs as well as an analysis of the pre-existing ethnobotanical literature of the Caucasus and neighboring regions (see aforementioned literature in the Data Analysis section), we can outline some wild food plant uses, which may be relevant to the pre-history and history of food ingredients.

- Russian Molokans, which represent a distinct, conservative ethno-religious group within the Eastern Slavic domain, have preserved a few ancient Slavic wild plant food uses (Pieron and Sõukand 2018) that are not common, to the same extent, in neighboring areas and ethnic groups: these include the culinary uses of *Rumex acetosella* leaves, lacto-fermented *Prunus spinosa* L. fruits, as well as *Armoracia rusticana*, *Crataegus* spp., and particularly *Viburnum opulus* fruits.
- The common traditional food uses by Tats of *Berberis vulgaris* L. fruits, especially in their original lacto-fermented preparation (Fig. 12) and *Ornithogalum* spp. are linked to the widespread culinary custom of using barberry fruits as a



Fig. 12 Lacto-fermented *Berberis vulgaris* fruits prepared in a Tat household of Dəmirçi

souring ingredient in Persian cuisine (Duguid 2016) and to the popularity of the complex *Ornithogalum-Muscari-Bellevalia* spp. group in Kurdistan and Iranian areas (Maassoumi and Bobrov 2004; Pieroni et al. 2018), whose uses are very ancient, as pollen of *Muscari* was found, for example, at the Shanidar IV archaeological site (dating to 35,000 years B.C.; Lietava 1992).

- Udi commonly used wild food plants include, apart from the aforementioned weedy plants *Portulaca oleracea* L. and *Chenopodium album*, *Smilax excelsa* L. shoots, whose food use is very common in Georgian cuisine, as well as in that of other autochthonous Caucasian speaking groups in Azerbaijan (Bussmann et al. 2016, 2017; Łuczaj et al. 2017; personal observations). Young shoots of *Smilax*, however, are still sometimes used in folk cuisines of the Eastern Mediterranean (Greece, SE Italy) (Pieroni and Cattero 2019).
- The common Azeri uses of wild plants, which normally have their ideal habitat in mountainous and pastoral landscapes, such as wild *Allium*, *Chaerophyllum*, *Prangos*, *Smyrniium*, and *Tragopogon* spp. are similar to the patterns we recorded in Kurdistan and that of other ethnobotanists in both the Caucasus and Eastern Turkey (Bussmann et al. 2016, 2017; Çakır 2017; Hovsepian et al. 2016; Kaval et al. 2015; Łuczaj et al. 2017; Pieroni et al. 2017, 2018; Polat et al. 2015, 2017).
- The common Azeri and Tat use of some weeds (synanthropic plants) as vegetables, such as *Capsella*, *Papaver*, and *Stellaria* spp., may be linked, in our opinion, to a possible horticultural shift/sedentarization that these two former pastoralist groups may have gone through.
- The widespread common use (recorded among all selected communities, but not Russians) of *Fagus orientalis* for *sarma* could be considered a pan-Caucasian custom (Bussmann et al. 2016, 2017; personal observations in various areas of Azerbaijan and Georgia).
- The widespread culinary use of *Rumex patientia* L. and related species among all our mountain communities confirms the role of the *Rumex* genus in the food economy of mountain communities in the geographical and cultural spectrum that proceeds westwards from the Caucasus to the Dinaric Alps in the Balkans (Pieroni and Quave 2014, and references therein).

Conclusions

The current study shows that foraging is a practice which is still very much alive in the Caucasus, particularly in mountainous areas and among the middle-aged and older generations and that local environmental knowledge, practices, and beliefs related to wild vegetables are crucial in the spring and autumn for coping with food insecurity, especially within the most disadvantaged households and among internal refugees from Karabakh who are, in fact, involved in foraging not only because gathering these ingredients and cooking them is part of their regional cultural heritage and possibly represents an identity-driver, but also for more pragmatic reasons such as coping with economic constraints and food shortages.

Moreover, the traditional knowledge attached to these practices, as well as the gastronomic heritage concerning the manipulation of the plant items within the household, their cooking processes, and the consumption frames are the result of complex co-evolutions where both human ecological origins and sensory factors (i.e. preferences for specific tastes) have shaped the foraging patterns of the studied communities over centuries. Eventually, this complex and diverse heritage needs to be not only preserved but concretely considered in rural development programs in order to foster culturally-sensitive endogenous alternatives in food security policies.

All this may require educational platforms aimed at re-instilling local knowledge in the younger generations as well as public engagement for increasing the awareness of rural and urban civil societies regarding the importance of neglected and disappearing traditional food ingredients. Moreover, nutritional and nutraceutical studies on a few of these neglected wild plant ingredients will be important for possibly addressing the beneficial effects of threatened local foods, which could in turn help foster the resurgence of a broader interest in traditional wild plant foraging.

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Compliance with ethical standards

Conflict of interest The authors declare that they have no conflict of interest.

Human and animal rights Interviews were conducted following ISE Code of Ethics (ISE 2008).

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