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Resilience at the border: traditional botanical knowledge among Macedonians and Albanians living in Gollobordo, Eastern Albania

Andrea Pieroni^{1*}, Kevin Cianfaglione², Anely Nedelcheva³, Avni Hajdari⁴, Behxhet Mustafa⁴
and Cassandra L Quave^{5,6}

Abstract

Background: Ethnobotany in South-Eastern Europe is gaining the interest of several scholars and stakeholders, since it is increasingly considered a key point for the re-evaluation of local bio-cultural heritage. The region of Gollobordo, located in Eastern Albania and bordering the Republic of Macedonia, is of particular interest for conducting ethnobiological studies, since it remained relatively isolated for the larger part of the 20th Century and is traditionally inhabited by a majority of ethnic Macedonians and a minority of Albanians (nowadays both sharing the Muslim faith).

Methods: An ethnobotanical survey focused on local food, medicinal, and veterinary plant uses was conducted with 58 participants using open and semi-structured interviews and via participant observation.

Results: We recorded and identified 115 taxa of vascular plants, which are locally used for food, medicinal, and veterinary purposes (representing 268 total plant reports). The Macedonian Traditional Ecological Knowledge (TEK) was greater than the Albanian TEK, especially in the herbal and ritual domains. This phenomenon may be linked to the long socio-cultural and linguistic isolation of this group during the time when the borders between Albania and the former Yugoslavia were completely closed. Moreover, the unusual current food utilisation of cooked potatoes leaves, still in use nowadays among Macedonians, could represent the side effect of an extreme adaptation that locals underwent over the past century when the introduction of the potato crop made new strategies available for establishing stable settlements around the highest pastures. Additionally, the difference in use of *Helichrysum plicatum*, which is popular in the local Macedonian folk medicine but absent among Albanians, confirms the particular significance of this taxon as it relates to the yellow colour of its flowers in South Slavic folklore.

Conclusion: Botanical studies with an ethnographic approach are crucial for understanding patterns of use of plants within given cultures. Importantly, such studies can also allow for analysis of the dynamics of change in these TEK patterns over the time. The results of this study may be important as baseline data set to be used in rural development programs in Gollobordo, aimed at fostering community-based strategies of management of natural resources.

Keywords: Ethnobotany, Albania, Gollobordo, Macedonians, Potato leaves

* Correspondence: a.pieroni@unisg.it

¹University of Gastronomic Sciences, Piazza Vittorio Emanuele 9, I-12042 Pollenzo, (Cuneo), Italy

Full list of author information is available at the end of the article

Background

Ethnobiological studies conducted in recent years in Eastern Europe have highlighted complex, dynamic systems of folk botanical, mycological, and ecological knowledge [1-28].

This heritage is known in the ethnobiological literature as Traditional Ecological Knowledge (TEK), which has been defined as a "cumulative body of knowledge, practice and belief evolving by adaptive processes and handed down through generations by cultural transmission, about the relationship of living beings (including humans) with one another and with their environment" [29].

In particular, the portion of TEK concerning plants is nowadays increasingly considered crucial in South and South-Eastern Europe for fostering community-based strategies of management of natural resources. It may also represent the starting point for initiatives aimed at the reevaluation of local plants devoted to both small scale food and herbal markets and eco-touristic initiatives [30-37]. Additionally, studies focused on plant uses that have been conducted in Eastern Europe with an in-depth historical or ethno-historical approach [38,39] or via archival research and/or contemporary surveys conducted among botanists remembering their childhood [40-44] have demonstrated how plant perceptions change over time, in response to a complex interplay of socio-cultural, environmental, and economic dynamics.

In the past few years, we have concentrated our research on the botanical knowledge overlaps and exchanges between South Slavs and Albanians in multi-cultural or bordering areas in South-Eastern Europe [26,39] and on the *resilience* of TEK [45] among diasporas in the same area [46]. In these studies, we observed phenomena of hybridization of botanical knowledge, as well as a more "herbophilic" [47] attitude of the Slavs in comparison to the Albanians. In the current study, we wanted to further analyze the local botanical knowledge systems among Macedonians and Albanians living in the Gollobordo region, in Eastern Albania.

We could postulate that ethnic Macedonians in this area in Albania preserved much of their original folk botanical heritage because of their isolation in the past decades. This isolation was especially evident during the Communist period (1945–1991), both from the Albanian neighbors and also from those Macedonians, who remained after the creation of the Albanian state (1912) on the other side of the border (at the time within the territory of the Kingdom of Serbia, later Kingdom of Serbs, Croats and Slovenes and then Yugoslavia, nowadays Republic of Macedonia). Nevertheless, the fact that both the Albanian and Macedonian communities of Gollobordo share the same faith (Islam) for the most part, with some intermarriage in the past decades, there may have been some exchange of botanical knowledge. In order to assess all of this, we designed the

objectives of this study to: 1) record traditional uses of local botanicals (both cultivated and wild) for food, medicine, and veterinary purposes among Macedonians and Albanians; 2) verify the occurrence of an expected richer, "more conservative" Macedonian ethnobotany; and 3) analyze differences and commonalities in the traditional plant knowledge between the two communities and to propose some explanatory models.

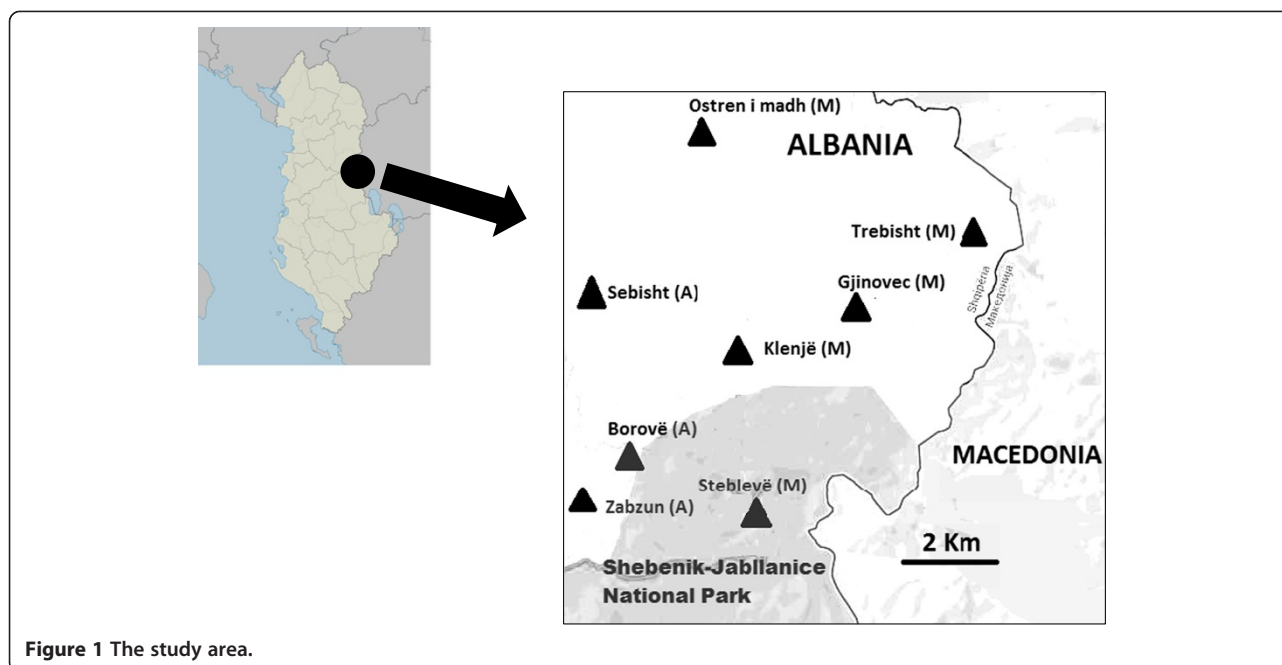
Methods

Study area

The current study was conducted in eight villages of the mountain of the Gollobordo area, in Eastern Albania, bordering the Republic of Macedonia (Figure 1); the focus was on three villages inhabited by ethnic Macedonians: Klenje (1,203 m.a.s.l.), Gjinovec (1,252 m.a.s.l.), and Steblevë (1,200 m.a.s.l.) – this last village included within the newly established Shebenik–Jabllanice National Park, with an overall permanent population of approx. 300 inhabitants (while Gjinovec is only inhabited nowadays during the late spring and summer months); and three villages inhabited by Albanians: Sebisht (915 m.a.s.l.), Borovë (940 m.a.s.l.), and Zabzun (1,028 m.a.s.l.), with an overall permanent population of approx. 300 inhabitants as well. Additionally, in order to have a sample more adherent to the ethnic proportion of Gollobordo (for which more than two-thirds is inhabited by Macedonians), a few additional interviews were also conducted in the larger Macedonian villages of Ostren i madh (948 m.a.s.l., approx. 1000 inhabitants) and Trebisht (782 m.a.s.l., approx. 1,000 inhabitants).

The local economy is based on small-scale farming and pastoralist activities, with a significant portion of the population that migrates to Tirana and/or other city centers and sometimes back for a few months in their villages only during the late spring and summer months (Figure 2). According to the Albanian Institute of Statistics data, Gollobordo and the entire Eastern and North-Eastern region of Albania (covering Peshkopia and Kukës counties) are among the economically poorest areas of not only the country, but also all of Europe [48]. All of the villages in the Gollobordo are nowadays permanently inhabited only by families of Islamic faith, while until the 1990s, most of the Macedonian villages also had an important Christian Orthodox component. The local dialect of the Macedonian minority, now spoken by less than 3,000 inhabitants, has been the focus of a number of studies conducted by Slavic linguists in the past Century. Two remarkable field ethnolinguistic and ethnographic studies have also been conducted in Gollobordo in recent years [49,50].

The climate of this area is continental, with very harsh temperatures and snowfall during the winter season. The landscape around these villages is dominated by low mountains covered by the *Quercus frainetto* woodland



belt, and by the *Fagus sylvatica* woodland belt at higher elevations. Sometimes it is possible to find some woodland fragments of *Quercus cerris* (in soil containing more clay) and *Castanea sativa* (in more acidic soil); in addition, there is some reforestation by *Pinus nigra*, probably carried out during the Communist period (1945–1991). The landscape is also covered by large extensions of secondary patches of semi-natural dry and humid grassland. A riparian marshy vegetation is found along the valleys, which is frequently fragmented and residual, dominated by some species of *Salix*, such as *S. alba*, *S. eleagnos* (sometimes really large) and, less frequently, *S. purpurea*. In the secondary succession, it is easy to find some different shrub species such as *Corylus avellana*, *Cornus mas*, *Juniperus communis*, *Crataegus monogyna*, *Crataegus sericea* and *Juniperus oxycedrus*. Up to the village of Klenje, within a high plateau, we could observe a large population of *Prunus cocomilia*.



The main herbal vegetation in the villages is anthropogenic, with ruderal/nitrophylic species and cultivars like *Vitis labrusca*, some fruit trees (esp. *Prunus* species) and some vegetables; *Vitis labrusca* is traditionally cultivated climbing on trees with light pruning.

The main trees are situated in a gradient between wild and domesticated conditions: *Fraxinus excelsior*, *Quercus cerris*, *Q. frainetto* (mostly as totem trees), *Prunus avium*, *P. domestica*, *P. cerasus*, *P. cerasifera*, *Juglans nigra*, *Cydonia oblonga*, *Malus domestica*, *Pyrus communis*, *Robinia pseudoacacia*, *Populus nigra*, *Ailanthus altissima*, *Syringa vulgaris*, *Acer campestre*, while the most common shrubs are *Rosa canina* s.l. and *Rubus hirtus*, *R. caesius*, *R. ulmifolius*, and *Clematis vitalba*.

Field study

In May 2013, in-depth open and semi-structured interviews were conducted with community members (n = 58, 43 Macedonians and 15 Albanians; age between 9 and 87 years old), which were selected using snowball sampling techniques. Study participants were asked about traditional uses of food, medicinal, veterinary, and ritual plants (in use until a few decades ago or still in use nowadays) via semi-structured and open interviews, walks in the natural environment in the proximity of the villages together with informants, and participant observation within the households. Specifically, local name(s) of each quoted taxon, the plant part(s) used, in-depth details about its/their manipulation/preparation and actual medicinal or food use(s) were recorded. Interviews were conducted in Albanian or Macedonian languages with the help a bilingual simultaneous translator. Prior informed

consent was always verbally obtained prior to conducting interviews and researchers adhered to the ethical guidelines of the American Anthropological Association [51]. During the interviews, informants were always asked to show the quoted plants. Voucher specimens were taken for the wild taxa, when available, and are deposited at the herbarium of the School of Biosciences and Veterinary Medicine of the University of Camerino, Italy (*Herbarium Universitatis Camerinensis*; acronym: CAME).

Taxonomic identification was conducted according to the official Flora of Albania [52-55] and the previous Albanian Excursion Flora [56]. For *Crataegus* spp. we referred to the Rosaceae's taxonomy in Euro + Med Plant-Base [57]. Family assignments follow the Angiosperm Phylogeny Group III system [58]. Local plant names were transcribed following the rules of the standard Ghegh Albanian and Macedonian languages.

Results and discussion

Overall, we recorded the local uses of 116 taxa of vascular plants; we documented 268 plant reports, 105 for food, 87 for human medicine, and 76 for veterinary applications.

Given the variety of means through which data were elicited in the field, detailed cultural importance, frequency and consensus indexes, which do always require consistently performed interviews, were not considered in the data analysis.

However, in the tables and in the data used for the comparison we included only plant uses reported by at least two informants, as well as those uses, which were quoted by the majority of the interviewees.

Food plants

The food use of 55 taxa were recorded, 25 of which are wild or semi-domesticated (Table 1).

Among the most uncommon uses, we have to mention the use of potato leaves, both for *sarma* (leaves rolled around a minced meat and rice filling) and especially as filling for white corn-flour based pies (*laknur* or *byrek* in Albanian, *komat* in Macedonian), which is still very common among the Macedonians living in the highest villages of Gollobordo, while among Albanians this was remembered as a past use only. We found this use of potato leaves as filling for savory pies to be quite common in Gollobordo in June, after the "nettle season" (*Urtica dioica*), which is the primary wild plant used in the early spring, while *Rumex* spp. dominates later in the season as a pie filling ingredient. We recently found a similar relictual use among the last Albanians living in the upper Reka valley, on the Macedonian side of Mount Korab [39].

The archaeologist Michael Galaty and his team have recently conducted intensive field research in the mountainous Shala Valley in Northern Albania. Galaty has proposed that the Little Ice Age and the introduction of maize, which

took place in the Balkans starting from the 16th Century [59,60], played a crucial role in the remarkable demographic expansion in this area in the 17th and 18th Century [61]. We believe that the introduction of the potato crop (*Solanum tuberosum*) in the mountainous areas of the Western Balkans and in the Gollobordo area (presumably at the end of the 19th Century) may have also similarly determined a remarkable vertical expansion of the inhabited landscape, offering locals for the first time in the history of the region the possibility to permanently colonize and settle the higher pastures. As a side-effect of this shift, which was sustained by an increase of food resources (dairy products and potatoes), the leaves of the potato plant may have also been considered as a vegetable, especially in the spring, where this would have largely become available and when not many other green leafy vegetables are available (apart from wild nettles and *Rumex* spp.). The toxic glycoalkaloid content of the potato leaves could perhaps be reduced by the way in which they are traditionally collected and prepared. Only the young leaves are gathered and they are boiled in water before being used as a pie filling. Indeed, research on the chemistry of *S. tuberosum* leaves has demonstrated that glycoalkaloid content (measured by levels of α -solanine and α -chaconine) are at their lowest in the young leaves, with those appearing on the most distal location of the stem having the overall lowest glycoalkaloid content [62]. However, the boiling step likely reduces small level of the overall glycoalkaloid content, thus the final product would be expected to contain a somewhat bitter quality, and indeed, our participants confirmed that the pie made with potato leaves is appreciated exactly because of its "bitter taste".

On the other hand, the consumption of "bitter" potatoes (with high glycoalkaloid contents) has been well discussed by Timothy Johns [63] for the case of the Aymara population in Southern America, where bitter potato varieties (*jank'o* and *luq'i*) were often eaten unprocessed after the harvest.

Other important uncommon cultivated food sources we found included the young leaves of corn (*Zea mays*) as pie filling, and bean leaves for use in *sarma*. Upon consideration of trees, the rare food use of *Prunus cocomilia* for producing home-made *raki* should be better analyzed under the viewpoint of sensory analysis for possible local economic development outcomes. In fact, the local know-how on mixing, fermenting, and home-distilling various *Prunus* tree fruits in Gollobordo, as in other areas of the Balkans, seems to be extremely sophisticated.

Medicinal plants

The recorded local uses of 53 medicinal plant taxa are reported in Table 2. It is worthwhile to mention the case of *Helichrysum plicatum* (Figure 3), which is the most quoted taxon among the Macedonians of Gollobordo.

Table 1 Local food plant uses recorded in the study area

Taxon, family and voucher specimen code	Recorded Albanian folk name(s)	Recorded Macedonian folk name(s)	Status	Plant part(s) used	Traditional modalities of consumption and other recorded information	Alb	Mac
<i>Allium cepa</i> L. Amaryllidaceae	Qepa	Кромид	C	AP; Bu	Raw and cooked (traditionally filling for pies made with corn flour - <i>byrek</i> ^{ALB} / <i>komat</i> ^{MAC})	+	+
<i>Allium porrum</i> L. Amaryllidaceae	Pras	Праз	C	AP	Filling for pies	+	
<i>Allium sativum</i> L. Amaryllidaceae	Hurdhëra	Лук	C	Bu	Seasoning	+	+
<i>Atriplex hortensis</i> L. Amaranthaceae	Laboda	Лабода, Лобода	C	L	Filling for pies	+	+
<i>Beta vulgaris</i> L. Amaranthaceae	Panxhari		C	R	Ingredient for making <i>halva</i> *	+	
<i>Brassica oleracea</i> L. Brassicaceae	Liakër, Liakra	Зелка, Расол	C	L	Filling for pies Pickled/lacto-fermented in water and salt; the liquid resulting from of the lacto-fermentation (<i>rasol</i>) was eaten with bread by the poorest community members*	+	+
<i>Capsicum annuum</i> L. Solanaceae	Spec	Пиперка	C	Fr	<i>Sarma</i> Filling for pies Cooked	+	+
<i>Castanea sativa</i> Mill. Fagaceae CAME 26314	Kostenja		W	Fr	Lacto-fermented in water and salt or in yogurt ricotta Boiled or roasted	+	+
<i>Cornus mas</i> L. Cornaceae CAME 26279	Thana	Дрен	W	Fr	Fermented and distilled into <i>raki</i> Fermented into vinegar Syrup and compote (dried fruits boiled with water and sugar) Concentrated syrup/soft jam (<i>pekmez</i>) Jam (Fermented?) beverage obtained boiling the fruits in water for a few hours (the resulting beverage is kind of a fruit soda, which is kept in the fridge or in the cellar; considered very healthy, is often consumed adding sugar)	+	+

Table 1 Local food plant uses recorded in the study area (Continued)

Taxon, family and voucher specimen code	Recorded Albanian folk name(s)	Recorded Macedonian folk name(s)	Status	Plant part(s) used	Traditional modalities of consumption and other recorded information	Alb	Mac
<i>Corylus avellana</i> L. Betulaceae CAME 26242	Leithija	Лешник	W	Se	Raw and dried	+	+
<i>Crataegus monogyna</i> Jacq. Rosaceae CAME 26280	Cut, Murriz	Глогиня, Глогиня дива (<i>C. monogyna</i>), Глогиня пилома (<i>C. sericea</i>)	W	Fr	Snack		+
<i>Crataegus sericea</i> Dzekov ^s Rosaceae CAME 26278					Fermented beverage Fermented into raki		+
<i>Cucumis sativus</i> L. Cucurbitaceae CAME 26291	Kastravec	Краставица	C	Fr	Pickled/lacto-fermented (in water and salt)	+	+
<i>Cucurbita maxima</i> Duch Cucurbitaceae	Kungull	Тиква	C	Fr	Filling for pies; pickled/lacto-fermented (in water and salt)	+	+
<i>Cydonia oblonga</i> Mill. Rosaceae CAME 26290	Ftoi	Дуња	C	Fr	Jams (sometimes prepared dipping in a preliminary procedure the fruits pieces in water and lime, then boiling with sugar, so that the fruit pieces remained hard at the end) Compote (fruits boiled with water) Fermented (?) beverage obtained boiling the fruits in water for a few hours (the resulting beverage is kind of fruit soda, which is kept in the fridge or in the cellar)	+	+
<i>Daucus carota</i> L. Apiaceae CAME 26208			C	R	Lacto-fermented in water and salt	+	
<i>Fagus sylvatica</i> L. Fagaceae	Ahu	Бук	W	K	Raw as snack (however, consumption of large amounts may generate headaches)*	+	+

Table 1 Local food plant uses recorded in the study area (Continued)

Taxon, family and voucher specimen code	Recorded Albanian folk name(s)	Recorded Macedonian folk name(s)	Status	Plant part(s) used	Traditional modalities of consumption and other recorded information	Alb	Mac
CAME 26249				Wo	Fuel for smoking meat	+	
<i>Fragaria × ananassa</i> Duch. ex Rozier	Lule shtrydhe		C	Fr	Raw	+	
Rosaceae							
<i>Fragaria vesca</i> L.	Derthea, Dirthehe	Ягодка, Ягода	W	Fr	Raw	+	+
Rosaceae							
CAME 26247							
<i>Helianthus tuberosus</i> L.		Шалгун	SD	T	Raw or cooked		+
Asteraceae							
CAME 26312							
<i>Hordeum vulgare</i> L.	Elb	Јачмен	C	Frfl	Bread (mixed with rye flour)*	+	
Poaceae							
				Fr	Roasted and decocted, as a kind of coffee	+	
<i>Juglans regia</i> L.	Arra	Орев	SD; C	K	Raw, or various cakes	+	+
Juglandaceae							
CAME 26238							
<i>Juniperus communis</i> L.	Dllinja	Смрека	W	Fr	Fermented and distilled into <i>raki</i>	+	+
Cupressaceae							
CAME 26253							
					Seasoning ingredient for lacto-fermented vegetables		+
<i>Lactuca sativa</i> L.	Sallata	Лоштика	C	L	Raw of filling for pies		+
Asteraceae							
<i>Malus domestica</i> Borkh.	Molla (Molla e kuqe, Sterkinka)	Јаболка (италианска, кисели, Ренета, Штерка)	C	Fr	Raw and dried (<i>hoshaf</i>)	+	+
Rosaceae							
CAME 26236							
					Sliced and dried; consumed boiled		+
				Fr	Fermented and distilled in <i>raki</i>	+	
<i>Malus sylvestris</i> (L.) Mill.	Molla e egër	Дива Јаболка	W	Fr	Dried (<i>hoshaf</i>)		+
Rosaceae							

Table 1 Local food plant uses recorded in the study area (Continued)

Taxon, family and voucher specimen code	Recorded Albanian folk name(s)	Recorded Macedonian folk name(s)	Status	Plant part(s) used	Traditional modalities of consumption and other recorded information	Alb	Mac
CAME 26288							
<i>Medicago sativa</i> L.	Jonxha		C	L	Fermented into vinegar Cooked, as an emergency (famine) food*	+	+
Fabaceae							
CAME 26292							
<i>Morus alba</i> L.	Mani	Мурвинка	C	Fr	Jams and compote	+	
Moraceae							
CAME 2631							
<i>Phaseolus vulgaris</i> L.	Fasulja, Grosh	Грав	C	Fr; Se	Fermented and distilled into <i>raki</i> Cooked	+	+
Fabaceae							
				L	Filling for pies <i>Sarma</i>		+
				UF	Cooked, filling for pies		+
<i>Prunus cerasifera</i> Ehrh.	Kumbullë Elbasani, Kumbullë kokormadhe	Слива Елбасанска	SD	Fr	Fermented and distilled in <i>raki</i>	+	+
Rosaceae							
CAME 26266							
					Fermented (?) beverage obtained boiling the fruits in water for a few hours	+	
					Jam		+
<i>Prunus avium</i> (L.) L.	Qershija	Цреша (питома)	C	Fr	Raw	+	+
Rosaceae							
CAME 26240							
<i>Prunus cerasus</i> L.							
CAME 26298							
Rosaceae							
					Jams	+	+
					Compote (fruits boiled with water and sugar)		+
					Fermented (?) beverage obtained boiling the fruits in water for a few hours (the resulting beverage is kind of fruit soda, which is kept in the fridge or in the cellar)		+
					Dye for hard boiled eggs to which are consumed on St. George's Day, as a good omen		+

Table 1 Local food plant uses recorded in the study area (Continued)

Taxon, family and voucher specimen code	Recorded Albanian folk name(s)	Recorded Macedonian folk name(s)	Status	Plant part(s) used	Traditional modalities of consumption and other recorded information	Alb	Mac
<i>Prunus cerasus</i> var. <i>marasca</i> (Host) Vis. Rosaceae CAME 26299	Qershija e egër	Дива цреша	W; C	Fr	Raw	+	+
<i>Prunus cocomilia</i> Ten. Rosaceae CAME 26277		Дива слива	W	Fr	Fermented and distilled into <i>raki</i>		+
<i>Prunus domestica</i> L. Rosaceae CAME 26239	Kumbulla	Слива (блага, магарица, жолта, синица)	C	Fr	Raw and dried	+	+
					Fermented and distilled into <i>raki</i>	+	+
					Jam	+	+
					Fermented (?) beverage obtained boiling the fruits in water for a few hours (the resulting beverage is kind of fruit soda, which is kept in the fridge or in the cellar)		+
<i>Prunus spinosa</i> L. Rosaceae CAME 26260	Kolumbria, Kurmulia	Дива слива	W	Fr	Gathered after the frost and consumed raw as snack, or fermented and distilled into <i>raki</i> , or transformed into a compote	+	
<i>Pyrus communis</i> L. Rosaceae CAME 26306	Dardha	Круша	C	Fr	Raw and dried	+	
					Compote (fruits boiled with water and sugar)		+
					Jam	+	
					Fermented and distilled into <i>raki</i>	+	
					Fermented (?) beverage obtained boiling the fruits in water for a few hours (the resulting beverage is kind of fruit soda, which is kept in the fridge or in the cellar)		+
<i>Pyrus pyrastrer</i> (L.) Burgsd. Rosaceae CAME 26244	Dhardhë e egër, Gorrica	Дива круша	W	Fr	Gathered after the frost, ripened on straw, and consumed dried or in compote	+	+
<i>Pyrus amygdaliformis</i> Vill. Rosaceae							

Table 1 Local food plant uses recorded in the study area (Continued)

Taxon, family and voucher specimen code	Recorded Albanian folk name(s)	Recorded Macedonian folk name(s)	Status	Plant part(s) used	Traditional modalities of consumption and other recorded information	Alb	Mac
CAME 26316					Jam		+
<i>Ribes multiflorum</i> Kit. ex Roem. et Schult.		Диво грозје	W	Fr	Snack		+
Grossulariaceae							
CAME 26263							
<i>Rubus idaeus</i> L.		Малина	W; C	Fr	Snack		+
Rosaceae							
CAM 26321					Syrup and compote (fruits boiled with water)		+
<i>Rubus hirtus</i> Waldst. et Kit.	Fermoza, Manaferra	Капина	W	Fr	Raw and jams	+	+
Rosaceae							
CAME 26258							
<i>Rubus ulmifolius</i> Schott							
Rosaceae							
CAME 26310							
<i>Rubus caesius</i> L.							
Rosaceae							
CAME 26245					Syrup and compote (fruits boiled with water)		+
					Fermented and distilled in <i>raki</i>	+	
<i>Rumex acetosa</i> L.	Ufull, Uthull	Киселец	W	L	Boiled, then in filling for pies (<i>byrek</i> ^{ALB} / <i>komat</i> ^{MAC}) or as vegetables cooked with rice and dairy products (<i>buranje</i> ^{ALB} / <i>zelje</i> ^{MAC}); traditionally dried and then used during the whole winter		+
Polygonaceae							
CAME 26243							
<i>Rumex conglomeratus</i>							
Murray							
CAME 26286							
Polygonaceae							
					Infusion: to be used for preparing yogurt (if starter culture is missing)		+
				L; St	Snack	+	+

Table 1 Local food plant uses recorded in the study area (Continued)

Taxon, family and voucher specimen code	Recorded Albanian folk name(s)	Recorded Macedonian folk name(s)	Status	Plant part(s) used	Traditional modalities of consumption and other recorded information	Alb	Mac
<i>Rumex patientia</i> L. Polygonaceae CAME 26285	Lepjeta	Щавел	W	L	Boiled, then used filling for pies or as vegetables cooked with dairy products; traditionally dried and then used during the winter	+	+
<i>Secale cereale</i> L. Poaceae	Thekna	Рж	C	Frfl	Mixed with corn flour: bread, esp. in the past*	+	+
<i>Solanum lycopersicum</i> L. Solanaceae	Domate, Patlixhan kuqe	Црвени патлиџани	C	UF	Roasted and decocted, as a kind of coffee Lacto-fermented in water and salt	+	+
				Fr	Raw and cooked	+	+
				L	Cooked (emergency/famine food)*	+	
<i>Solanum melongena</i> L. Solanaceae	Patlixhan i zezë	Црни патлиџани	C	Fr	Cooked	+	
<i>Solanum tuberosum</i> L. Solanaceae	Patate	Компири	C	T	Cooked	+	+
				YL	Filling for pies (only in the past among Albanians)*. The bitter taste is particularly appreciated by the Macedonian communities; young potatoe leaves are the most common filling for the traditional pie (<i>komat</i>) in June, after the young nettle's season end	+	+
<i>Taraxacum officinale</i> Weber ex F.H. Wigg. Asteraceae CAME 26289	Qumështore	Млечак, Млекаица, Жело	W	L	<i>Sarma</i> Salads		+
<i>Urtica dioica</i> L. Urticaceae CAME 26262	Hjeth, Hisel, Hithra, Hith	Коприва	W	YL	Boiled, then used in filling for pies or cooked with rice and dairy products	+	+
<i>Vaccinium myrtillus</i> L. Ericaceae	Borovnica, Rrush i egër	Диво грозје, Цршине	W	Fr	Snack	+	+
					Fermented into a fruit soda-like beverage		+
					Compote		+
<i>Vitis labrusca</i> L. Vitaceae	Rrush (variety Çelek)	Грозје (Шилек)	C	Fr	Fermented into wine or vinegar	+	+

Table 1 Local food plant uses recorded in the study area (Continued)

Taxon, family and voucher specimen code	Recorded Albanian folk name(s)	Recorded Macedonian folk name(s)	Status	Plant part(s) used	Traditional modalities of consumption and other recorded information	Alb	Mac
CAME 26265					Concentrated juice (<i>pekmez</i>)		+
					Fermented (?) beverage obtained boiling the fruits in water for a few hours (the resulting beverage is kind of fruit soda, which is kept in the fridge or in the cellar)		+
				L	<i>Sarma</i>	+	+
<i>Zea mays</i> L.	Misër	Пченка	C	Frfl	Bread, pies	+	+
Poaceae							
				YL	Filling for pies		+
Diverse tree species			W; C	WA	Added to flour, water, and eggs for producing home-made noodles (<i>jufka</i>)	+	
					As a disinfectant, rubbed onto the sheep's stomach before it is cooked and eaten		+
					Added to water when boiling corn		+

[§]: first record of the species in Albania.

In bold: folk taxa quoted by more than 40% of the informants.

C: cultivated; SD: semi-domesticated; W: wild.

*: past use.

+: recorded use.

Plant part(s) used: AP aerial parts; Bu bulbs; Fr fruits; Frfl flour from fruits; K kernels; L leaves; R roots; Se seeds; St stems; T tubers; UF unripe fruits; Wo wood; WA ashes from wood; YL young leaves.

Table 2 Medicinal local plant uses recorded in the study area

Taxon, family and voucher specimen code	Folk name(s) recorded among Albanians	Folk name(s) recorded among Macedonians	Status	Plant part(s) used	Recorded modalities of medicinal uses(s) and treated pathologies	Alb	Mac
<i>Achillea collina</i> (Becker ex Rchb.f.) Heimerl Asteraceae		Бело цвеке	W	Fl	Decoction: cicatrizing on wounds		+
<i>Achillea millefolium</i> L. Asteraceae CAME 26294							
<i>Allium cepa</i> L. Amaryllidaceae	#	#	C	J	Instilled in the ear for treating earaches		+
<i>Allium porrum</i> L. Amaryllidaceae	#	#	C	AP	Heated, mixed with water and salt, to externally treat chilblains		+
<i>Allium sativum</i> L. Amaryllidaceae	#	#	C	J	Instilled in the ear for treating earaches	+	
				Bu	Consumed as an anti-hypertensive	+	+
<i>Arum italicum</i> Mill. Araceae	Shakulliza		W	Fr	To be worn as amulet against the evil-eye in the or in necklaces (<i>sysh, naok</i>) Infusion: arthritis	+	+
<i>Asplenium trichomanes</i> L. Aspleniaceae CAME 26293	Fier guri		W	L	Infusion: diuretic	+	+
<i>Bovista</i> sp. Agaricaceae	Fenë arrushe, Fushkaica	Пуша	W	DFB	Externally applied on wounds	+	+
<i>Cirsium arvense</i> (L.) Scop. Asteraceae		Овзец	W	AP	Fodder		+
<i>Cornus mas</i> L. Cornaceae CAME 26279	#	#	W	Fr	Consumed as snack for strengthening the heart		+
					Fermented into vinegar, applied on the breast: anti-fever	+	
					Fermented and distilled in raki, drunk: anti-asthmatic; believed to able to treat "seven" diseases		+
				FB	As part of the <i>lule ditvere</i> ("flower of the summer") bunch, which is hang in March on the churn and on the stable doors, as a good omen for the diary production	+	+

Table 2 Medicinal local plant uses recorded in the study area (Continued)

Taxon, family and voucher specimen code	Folk name(s) recorded among Albanians	Folk name(s) recorded among Macedonians	Status	Plant part(s) used	Recorded modalities of medicinal uses(s) and treated pathologies	Alb	Mac
<i>Corylus avellana</i> L. Betulaceae CAME 26242	#	#	W	FB	As part of the <i>lule ditvere</i> ("flower of the summer") bunch, which is hung in March on the churn, as a good omen for the dairy production		+
<i>Crataegus monogyna</i> Jacq. Rosaceae CAME 26280	#	#	W	Th	Externally applied: for treating snake bites		+
<i>Crataegus sericea</i> Dzekov ^s Rosaceae CAME 26278				L; F Fr FB	Infusion: for treating headaches, insomnia, hypertension, anti-rheumatic, anti-cancer Decoction: cardiotoxic, stomachaches, anti-fever, anti-rheumatic As part of the <i>lule ditvere</i> ("flower of the summer") bunch, which is hung in March on the churn and on the stable doors, as a good omen for the dairy production; same at St. George's day (May 6 th)		+ + +
<i>Cruciata laevipes</i> Opiz Rubiaceae CAME 26276	Gjak edhe qumësht		W	AP	Crushed, mixed with salt, and given as fodder to the sheep at St. George's Day (May 6 th): considered propitiatory for the good health of the animals		+
<i>Cydonia oblonga</i> Mill. Rosaceae CAME 26290	#	#	C	L	Infusion: stomachache	+	+
<i>Euphorbia characias</i> L. Euphorbiaceae CAME 2628	Rrydh, Shpengull	Лишаж	W	R	As part of the <i>lule ditvere</i> ("flower of the summer") bunch, which is hang on the churn, as a good omen for the diary production	+	+
<i>Fraxinus excelsior</i> L. Oleaceae CAME 26304		Јасика	W	L	Infusion: diuretic		+
<i>Helleborus odoratus</i> Waldst. et Kit. ex Willd. Ranunculaceae	Kukurek, Lule ditvere	Кукурек	W	R	Inserted on the horse ear: panacea	+	

Table 2 Medicinal local plant uses recorded in the study area (Continued)

Taxon, family and voucher specimen code	Folk name(s) recorded among Albanians	Folk name(s) recorded among Macedonians	Status	Plant part(s) used	Recorded modalities of medicinal uses(s) and treated pathologies	Alb	Mac
CAME 26282				F	As part of the <i>Jule ditvere</i> ("flower of the summer") bunch, which is hang on the churn, as a good omen for the dairy production	+	+
<i>Helichrysum plicatum</i> DC. and other <i>Helichrysum</i> species	Borsillok i verdhë	Свилен	W	FAP	Infusion: appetizing, stomachaches, as a digestive, anti-diarrheal, cardi tonic, diuretic, anti-moths		+
Asteraceae							
CAME 26274					Infusion: hepatitis	+	
<i>Hypericum perforatum</i> L.		Балсам	W	FAP	Infusion: stomachache		+
Hypericaceae							
CAME 26270							
<i>Juglans regia</i> L.	#	#	SD	UF	Infusion: for treating hyperthyroidism		+
Juglandaceae							
CAME 26238					Crushed, externally applied on the hair as dyeing agent	+	+
<i>Juniperus communis</i> L.	#	#	W	Fr	Infusion: diuretic, stomach-aches, anti-cold, bechic		+
Cupressaceae							
CAME 26253							
<i>Juniperus oxycedrus</i> L.		Смрека	W	Fr	Fermented and distilled into raki, which is drunk for treating asthma Infusion: bechic	+	+
Cupressaceae							
CAME 26267							
<i>Malus domestica</i> Borkh.	#	#	C	Fr	Sliced and dried; consumed boiled for treating stomachache		+
Rosaceae							
CAME 26236							
<i>Malva sylvestris</i> L.		Леблебија	W	Fr	Snack		+
Malvaceae							
CAME 26295							
<i>Matricaria chamomilla</i> L.	Kamomill		W	FT	Infusion: recreational	+	
Asteraceae							

Table 2 Medicinal local plant uses recorded in the study area (Continued)

Taxon, family and voucher specimen code	Folk name(s) recorded among Albanians	Folk name(s) recorded among Macedonians	Status	Plant part(s) used	Recorded modalities of medicinal uses(s) and treated pathologies	Alb	Mac
<i>Melissa officinalis</i> L. Lamiaceae CAME 26235	Bosillek Micël		C	AP	Infusion: headaches		+
					Infusion in external washes for newlyweds, as a good omen	+	
					High dosage to be avoided by males, who could lose their libido		+
<i>Nicotiana tabacum</i> L. Solanaceae	Duhan		C	L	Dried and ground (tobacco), externally applied on wounds	+	
<i>Orchis</i> spp. Orchidaceae	Salep	Салеп	W	R	Dried, powdered, then in decoction: panacea, reconstituent (often consumed with bread); to improve fertility in males	+	+
					Dried, powdered, then in decoction: hepatitis		+
<i>Origanum vulgare</i> L. Lamiaceae CAME 26233	Bozillek i malit, Çaj i malit, Çaj i zi, Çaj veni	Планински чај	W	FT	Infusion: recreational, anti-flu, bechic	+	+
					Infusion: anti-hepatitis		+
					Infusion: for treating stomachaches, panacea		+
<i>Phaseolus vulgaris</i> L. Fabaceae	#	#	C	Se	Half beans are applied on the skin affected by a dog bite; when the beans fall off, the wound is healed		+
<i>Plantago lanceolata</i> L. Plantaginaceae CAME 26284	Bar prenash, Dell, Lulë dheli, Premie	Жилавец	W	L	Crushed and topically applied on wounds: haemostatic	+	+
<i>Plantago major</i> L. CAME 26261 Plantaginaceae							
<i>Primula veris</i> L. Primulaceae CAME 26317	Lulë aguliçe, Lula dasht, Sgarifet	Гороцвеке	W	FAP	Infusion: for treating stomachaches		+
					Infusion: panacea, cough		+
					Infusion: intestinal troubles in kids		+
					Infusion: externally applied on eye inflammations		+

Table 2 Medicinal local plant uses recorded in the study area (Continued)

Taxon, family and voucher specimen code	Folk name(s) recorded among Albanians	Folk name(s) recorded among Macedonians	Status	Plant part(s) used	Recorded modalities of medicinal uses(s) and treated pathologies	Alb	Mac
<i>Prunus domestica</i> L. Rosaceae CAME 26239	#	#	C	Fr	Fermented and distilled in raki, topically applied, especially for wounds	+	+
					Fermented and distilled into raki, which is drunk hot with sugar for treating cold		+
					Fermented and distilled into raki, externally applied with salt for treating toothache		+
<i>Prunus spinosa</i> L. Rosaceae CAME 26260		#	W	Fr	Infusion: anti-rheumatic and anti-fever		+
					Infusion: stomachache anti-diarrheal	+	
<i>Pyrus pyraister</i> (L.) Burgsd. Rosaceae CAME 26244	#	#	W	Fr	Decoction of the dried fruits with sugar: stomachaches		+
<i>Pyrus amygdaliformis</i> Vill. Rosaceae CAME 26316							
<i>Ribes multiflorum</i> Kit. ex Roem. et Schult. Grossulariaceae CAME 26263		#	W	Fr	Consumed as snack and for treating digestive discomfort		+
<i>Rosa canina</i> L. s.l. Rosaceae CAME 26237	Karametha, Kroc, Kroza	Шипинка	W	Fr	Infusion: panacea	+	+
					Infusion: anti-diarrheal, stomachaches		+
					Infusion: sore throats, bechic, flu	+	+
					Infusion: to treat "seven diseases", blood depurative, diuretic, cardi tonic, anti-fever		+
<i>Rubus hirtus</i> Waldst. et Kit. Rosaceae CAME 26258	#	#	W	Fr	Oleolite in topical application: anti-haemorrhoidal	+	
<i>Rubus ulmifolius</i> Schott Rosaceae							

Table 2 Medicinal local plant uses recorded in the study area (Continued)

Taxon, family and voucher specimen code	Folk name(s) recorded among Albanians	Folk name(s) recorded among Macedonians	Status	Plant part(s) used	Recorded modalities of medicinal uses(s) and treated pathologies	Alb	Mac
CAME 26310							
<i>Rubus caesius</i> L.							
Rosaceae							
CAME 26245							
					Fermented and distilled into raki, which is considered cardi tonic		+
				L	Infusion: for treating stomachaches, anti-diarrheal, esp. in children	+	
				Sh	Externally applied on skin for treating infections	+	
<i>Sambucus ebulus</i> L.		Див боз	W	Fr	Externally for treating herpes		+
Adoxaceae							
CAME 26254							
<i>Sideritis raeseri</i> Boiss. et Heldr.	Çai i bardhë, Çai mali		W	FAP	Infusion: flu	+	
Lamiaceae							
CAME 26281							
<i>Solanum tuberosum</i> L.	#	#	C	T	Externally applied (in slices) for treating eye inflammations or head-aches*		+
Solanaceae							
<i>Taraxacum officinale</i> Weber ex F.H. Wigg.	#	#	W	Fl	As part of the <i>lule ditvere</i> ("flower of the summer") bunch, which is hung on the churn, as a good omen for the dairy production		+
Asteraceae							
CAME 26289							
<i>Thymus longicaulis</i> C. Presl.		Полски чај	W	AP	Infusion: panacea		+
Lamiaceae							
CAME 26272							
<i>Tilia platyphyllos</i> Scop.	Çaj blini	Пушала	W	Fl	Infusion: panacea	+	+
Malvaceae							
CAME 26241							
					Infusion: recreational, flu		+
<i>Ulmus minor</i> Mill. and other <i>Ulmus</i> spp.	Vidh		W	G	Infusion: anti-hepatitis	+	
Ulmaceae							

Table 2 Medicinal local plant uses recorded in the study area (Continued)

Taxon, family and voucher specimen code	Folk name(s) recorded among Albanians	Folk name(s) recorded among Macedonians	Status	Plant part(s) used	Recorded modalities of medicinal uses(s) and treated pathologies	Alb	Mac
CAME 26303							
<i>Urtica dioica</i> L.	#	#	W	L	Externally rubbed on the affected part (eventually with salt): anti-rheumatic	+	
Urticaceae							
CAME 26262							
				L; R	Infusion: anti-rheumatic	+	+
				YL	Cooked with rice with rice, eggs, and dairy products (<i>buranje</i> ^{ALB} / <i>zelje</i> ^{MAC}), as post-partum reconstituent		+
				AP	Externally applied for treating bruises	+	+
					Externally rubbed on breasts in cows affected by the evil-eye		+
				R	Decoction: anti-rheumatic	+	
<i>Vaccinium myrtillus</i> L.	#	#	W	Fr	Snack for treating stomachache		+
Ericaceae							
					Infusion: anti-fever		+
<i>Verbascum longifolium</i> Ten.		Допушке	W	L	Infusion: flu		+
Scrophulariaceae							
CAME 26287							
Diverse tree species			W; C	WC	Hot charcoal put in water and the resulting liquid in external washes on the face of the child suffering from the evil-eye; or thrown on the person suspected to be the gazer		+
				WC	Powdered and applied on the mom's breast to wean the baby*	+	
Diverse tree species			W; C	DW	Smoked, as a deterrent for bees and then anti-bites		+
				WA	Externally applied (warm) on the cheek for treating toothache or on the neck for treating tonsillitis		+
Not identified		Млечка	W	AP	Infusion: hepatitis		+

[‡]: first record of the species in Albania.

In bold: folk taxa quoted by more than 40% of the informants.

C: cultivated; SD: semi-domesticated; W: wild.

*: past use.

#: see Table 1.

+: recorded use.

Plant part(s) used: AP aerial parts; Bu bulbs; DFB dried fruiting body; DW decayed wood; FAP flowering aerial parts; FB flowering branches; FI flowers; Fr fruits; FT flowering tops; G galls; J juice; L leaves; R roots; Se seeds; Sh Shoots; T tubers; Th thorns; UF unripe fruits; WA ashes from wood; WC charcoal from wood; YL young leaves.



Figure 3 Dried flowering aerial parts of *Helichrysum* sp.

Within this ethnic group, this medicinal herb is the most frequently used remedy as it is applied in the treatment of many diseases as a kind of panacea. The high cultural consensus concerning the use of *Helichrysum* spp. in the Macedonian and Bulgarian medical folklore is remarkable in the scientific literature. A number of folk names referred to this taxon in Bulgarian retain the root “smil”, which has the meaning of physical beauty and health; moreover, in Bulgarian folk medicine, this taxon has been considered to be a real panacea and is often used for many purposes: as a diuretic, against dropsy, liver diseases, jaundice, stagnation of blood in the abdomen, tinnitus, low blood pressure, bone spikes, rheumatism, sciatica, rickets, worms, deafness and for treating skin diseases [64,65]. The ritual use of this plant in the South Slavic folklore is often linked to the bright yellow color of its flowers, which symbolizes sun and light, virginity, moral purity, and mercy in the Balkan folkloric tradition [66]. In Bulgaria, *Helichrysum* had to be collected in the morning of *Georgyovden* (corresponding to St. George's day, May 6th) and were sewn into the hem of garments as an amulet. In order to prevent jaundice in newborns, a bunch of *Helichrysum* was placed under the infant's pillow. The flowering aerial parts of this plant were used in wedding bouquets and the plant is mentioned in wedding songs and used as a sign of marriage [65,67].

Additionally, flowers of *Helichrysum* were believed to be able to provide a girl with a fiancé; according to this belief, while the flower is fresh, the girl will be a maiden, when it has withered – she will be engaged, and when it is dried – she will marry [65].

Veterinary plants

The uses of 57 plant taxa for ethnoveterinary purposes are reported in Table 3. Apart from a certain number of fodder plants and a few medicinal remedies, a large portion of this section of the local ethnobotany is represented by plants that are used ritually for the *Georgyovden* feast (corresponding to St. George's Day), in order to propitiate good health for the animals or a successful season for the dairy products. This tradition is especially relevant within the Macedonian community and it is well rooted within other South Slavic customs. In Bulgaria, for example, the St. George's Day is associated with plant decorations being used to “protect” the animals and the house: *Salix* spp., *Juglans regia*, *Artemisia* spp., *Clematis vitalba*, *Glechoma hederacea*, *Veronica officinalis*, *Chamaecytisus hirsutus*, *Convallaria majalis*, *Ranunculus acris*, *Caltha palustris*, *Ajuga* spp., *Lamium purpureum*, and *Ranunculus ficaria* [65,67,68].

Drazheva has analyzed the coincidence of St. Georges' Day with the most important spring feast in rural Bulgaria, which is widespread with varied rituals [69]. According to this review, one of the main circles connected with St. George's Day focuses around the ritual taking of the sheep to their summer pasture, the ritual milking, the sacrificial practices devoted to a saint who has inherited the characteristic features of the patron-ancestor of the Thracian Heroes, including the open-air feast usually associated with them. A second circle of rites and customs connected to *Georgyovden* is intended for guaranteeing health and well-being for the family, with fortune-telling about the forthcoming wedding feasts for the young people, which is directly related with the reproduction of the community in both its biological and social dimensions.

Cross-cultural ethnobotany: Macedonian vs. Albanian plant knowledge

From our analysis of the overlap between the Macedonian and Albanian ethnobotanies, we could point out that majority of plant reports (approx. half) were quoted by Macedonians only. However, this could be due to the uneven sample selection between the two field studies: the number of the Macedonian informants was roughly three times larger than the number of the Albanian interviewees. On the other hand, it is important to note that only extremely limited new information was found in both communities after the first dozen in-depth interviews. Our findings could support the persistence of

Table 3 Local plants considered for improving the animals' well-being in the study area

Taxon, family and voucher specimen code	Folk name(s) recorded among Albanians	Folk name(s) recorded among Macedonians	Status	Plant part(s) used	Recorded local use(s)/perceptions(s)	Alb	Mac
<i>Acer campestre</i> L. Sapindaceae CAME 26252		Клен	W	Br	Fodder (goats)		+
<i>Acer pseudoplatanus</i> L. Sapindaceae CAME 26313		Јавор	W	Br	Fodder		+
<i>Achillea millefolium</i> L. Asteraceae CAME 26294	=	=	W	FAP	Infusion: for treating rumination troubles		+
<i>Allium sativum</i> L. Amaryllidaceae	#	#	C	Bu	In necklaces to be worn on the cow's horns against the evil-eye (<i>sysh, naok</i>); evil-eye symptoms include the animal not producing milk	+	+
<i>Alnus glutinosa</i> (L.) Gaertn. Betulaceae CAME 26307		Габор	W	Br	Crushed, mixed with salt, and given as fodder to the sheep on St. George's Day (May 6 th): considered propitiatory for the good health of the animals Fodder		+
<i>Arctium minus</i> (Hill) Bernh. Asteraceae CAME 26296	Kokuta		W	AP	Fodder		+
<i>Arctium lappa</i> L. Asteraceae							
<i>Avena sativa</i> L. Poaceae		Овс	C	Fr	Fodder, esp. considered good for the horse's coat		+
<i>Beta vulgaris</i> L. Amaranthaceae	#	#	C	L	Fodder (raw or in decoctions)	+	+
<i>Bovista</i> sp. Agaricaceae	=	=	W	DFB	Externally applied on wounds as an haemostatic (horses)		+
<i>Capsicum annuum</i> L. Solanaceae	#	#	C	Fr	Lacto-fermented; the resulting fruits opened and externally applied on the forehead for treating headaches		+
<i>Carpinus orientalis</i> Mill. Betulaceae	Shkoza	Шкоз	W	Br	Fodder at St. George's Day (considered as a good omen)		+

Table 3 Local plants considered for improving the animals' well-being in the study area (Continued)

Taxon, family and voucher specimen code	Folk name(s) recorded among Albanians	Folk name(s) recorded among Macedonians	Status	Plant part(s) used	Recorded local use(s)/perceptions(s)	Alb	Mac
CAME 26301							
<i>Chelidonium majus</i> L. Papaveraceae	Gjak edhe qumësht		W	AP	Crushed, mixed with salt, and given as fodder to the sheep on St. George's Day (May 6 th): considered propitiatory for the good health of the animals, but also as a blood depurative and galactagogue	+	
CAME 26250							
<i>Chenopodium album</i> L. Amaranthaceae	Llabot		W	AP	Fodder	+	
CAME 26300							
<i>Clematis vitalba</i> L. Ranunculaceae	Kurpna	Повит	W	AP	Fodder	+	
CAME 26259							
<i>Cornus mas</i> L. Cornaceae	#	#	W	Fl	Honey plant	+	
CAME 26279							
<i>Corylus avellana</i> L. Betulaceae	#	#	W	Fl	Honey plant	+	
CAME 26242							
<i>Crataegus monogyna</i> Jacq. Rosaceae	#	#	W	Fl	Honey plant	+	
CAME 26280							
<i>Crataegus sericea</i> Dzekov ^s Rosaceae							
CAME 26278							
<i>Cruciata laevipes</i> Opiz Rubiaceae	=		W	AP	Crushed, mixed with salt, and given as fodder to the sheep on St. George's Day (May 6 th): considered propitiatory for the good health of the animals	+	
				Br	Fodder (sheep and goats)		+
				FB	Hung on churns and stable doors on St. George's Day (May 6 th) as a good omen for the dairy production		+

Table 3 Local plants considered for improving the animals' well-being in the study area (Continued)

Taxon, family and voucher specimen code	Folk name(s) recorded among Albanians	Folk name(s) recorded among Macedonians	Status	Plant part(s) used	Recorded local use(s)/perceptions(s)	Alb	Mac
CAME 26276							
<i>Cucurbita maxima</i> Duch.	#	#	C	Fr	Fodder		+
Cucurbitaceae							
<i>Cydonia oblonga</i> Mill.	#	#	C	Fl	Honey plant	+	
Rosaceae							
CAME 26290							
				L	Infusion: stomachache		
				FB	Hung on churns and stable doors on St. George's Day (May 6 th) as a good omen for the dairy production		+
<i>Euphorbia characias</i> L.	#		W	WP	Considered poisonous and irritating the skin	+	
Euphorbiaceae							
CAME 26283							
<i>Fagus sylvatica</i> L.	#	#	W	Fr	Fodder (esp. sheep)	+	+
Fagaceae							
CAME 26249							
				L	Fodder, esp. for sheep and equines	+	+
				Wo	Burned, as repellent for the bees when removing honey from the hives		
<i>Fraxinus excelsior</i> L.	=		W	Br	Fodder for sheep		+
Oleaceae							
CAME 26304							
<i>Helleborus odoratus</i> Waldst. et Kit. ex Willd.	=	=	W	AP	Ritually hung on doors and gates on March 13 th as a good omen	+	+
Ranunculaceae							
CAME 26282							
				R	Inserted on the horse ear: panacea		+
				BFAP	Hung on the entry gates (to homes and stables), or on the churn on St. George's Day (May 6 th): considered a good omen	+	+
<i>Helichrysum plicatum</i> DC. and other <i>Helichrysum</i> spp.	=	=	W	FAP	Infusion: for treating rumination troubles and diarrhea; kerato-conjunctivitis in sheep		+
Asteraceae							

Table 3 Local plants considered for improving the animals' well-being in the study area (Continued)

Taxon, family and voucher specimen code	Folk name(s) recorded among Albanians	Folk name(s) recorded among Macedonians	Status	Plant part(s) used	Recorded local use(s)/perceptions(s)	Alb	Mac
CAME 26274							
<i>Hordeum vulgare</i> L.		Јачмен	C	Fr	Fodder, esp. considered good for improving the beauty of horse's coat		+
Poaceae							
<i>Malus domestica</i> Borkh.	#	#	C	L	Fodder for goats		+
Rosaceae							
CAME 26236							
				FB	Hung on churns and stable doors on St. George's Day (May 6 th) as a good omen for the dairy production		+
<i>Medicago sativa</i> L.	Jonxha		C	AP	Fodder; considered good for improving the beauty of horse's coat	+	+
Fabaceae	Njonxhë						
CAME 26292							
				AP	Galactagogue for animals		+
<i>Melissa officinalis</i> L.	=	=	W	Fl	Honey plant		+
Lamiaceae							
CAME 26235							
<i>Populus nigra</i> L.	Plepi		W	L	Fodder		+
Salicaceae							
CAME 26302							
<i>Primula veris</i> L.	=	=	W	FAP	Hung on churns and stable doors on St. George's Day (May 6 th) as a good omen		+
Primulaceae							
CAME 26317							
<i>Prunus avium</i> (L.) L.	#	#	W	Br	Fodder		+
Rosaceae							
CAME 26240							
<i>Prunus domestica</i> L.	#	#	C	L	Fodder for goats		+
Rosaceae							
CAME 26239							
<i>Prunus cerasus</i> L.	#	#	C	Br	Fodder		+
Rosaceae							

Table 3 Local plants considered for improving the animals' well-being in the study area (Continued)

Taxon, family and voucher specimen code	Folk name(s) recorded among Albanians	Folk name(s) recorded among Macedonians	Status	Plant part(s) used	Recorded local use(s)/perceptions(s)	Alb	Mac
CAME 26298							
<i>Pteridium aquilinum</i> (L.) Kuhn	Fier		W	L	Bedding for animals	+	
Dennstaedtiaceae							
CAME 26315							
<i>Quercus cerris</i> L.	Bung, Çarri, Dushk, Lis	Добк	W	Fr	Fodder for sheep and goats	+	+
Fagaceae							
CAME 26256							
<i>Quercus frainetto</i> Ten.							
Fagaceae							
CAME 26246							
				Br	Dried, and stored in loft: fodder	+	+
			W	Sa	Externally instilled in the ear for treating earaches		+
<i>Robinia pseudoacacia</i> L.	Akac, Bagren		W	Fl	Honey plant	+	
Fabaceae							
CAME 26305							
<i>Rosa canina</i> L. s.l.			W	Fl	Honey plant		+
Rosaceae							
CAME 26237							
<i>Salix alba</i> L.	Shelçë, Shelgë		W	L	Fodder for goats	+	
CAME 26251							
Salicaceae							
<i>Salix eleagnos</i> Scop.							
Salicaceae							
CAME 26248							
<i>Salix purpurea</i> L.							
Salicaceae							
CAMNE 26255							
			W	Fl	Honey plant	+	
<i>Salvia verticillata</i> L.	Gombelik, Lule bulli	Гомбели	W	AP	Fodder	+	+
Lamiaceae							

Table 3 Local plants considered for improving the animals' well-being in the study area (Continued)

Taxon, family and voucher specimen code	Folk name(s) recorded among Albanians	Folk name(s) recorded among Macedonians	Status	Plant part(s) used	Recorded local use(s)/perceptions(s)	Alb	Mac
<i>Sambucus ebulus</i> L. Adoxaceae CAME 26254	=	=	W	Fr	Externally for treating wounds in sheep		+
					Consumed by cats and dogs on their own when they do not feel well		+
				Fr	Fermented and distilled into <i>raki</i> (rare)		+
<i>Secale cereale</i> L. Poaceae	#	#	C	St	Galactagogue for animals (esp. given to the cows one month before giving birth)	+	+
<i>Solanum tuberosum</i> L. Solanaceae	#	#	C	T	Fodder		+
<i>Syringa vulgaris</i> L. Oleaceae CAME 26309		Јоргован	C	FB	Hung on churns and stable doors on St. George's Day (May 6 th) as a good omen for the dairy production		+
<i>Tanacetum macrophyllum</i> (Waldst. et Kit.) Sch. Bip. Asteraceae CAME 26269		Вратика	W	AP	Together with nettles, this is rubbed on the goat's mammaries on St. George's day (May 6 th) to improve milk production		+
<i>Tanacetum vulgare</i> L. Asteraceae CAME 26268			W	AP	Hung on churns and stable doors on St. George's Day (May 6 th) as a good omen for the dairy production		+
					Mixed with salt and given to sheep who are thirsty		+
					Fodder		+
<i>Taraxacum officinale</i> Weber ex F.H. Wigg. Asteraceae CAME 26289	#	#	W	Fl	Crushed, mixed with salt, and ritually given as fodder to the animals on St. George's Day (May 6 th): considered a good omen and galactagogue		+
					Honey plant		+
<i>Trifolium pratense</i> L. Fabaceae CAME 26297,	Detelina		W	L	Fodder for sheep	+	+
<i>Trifolium incarnatum</i> L. ssp. <i>molineri</i> (Hornem.) Ces. Fabaceae							

Table 3 Local plants considered for improving the animals' well-being in the study area (Continued)

Taxon, family and voucher specimen code	Folk name(s) recorded among Albanians	Folk name(s) recorded among Macedonians	Status	Plant part(s) used	Recorded local use(s)/perceptions(s)	Alb	Mac
CAME 26318, and other <i>Trifolium</i> spp.							
Fabaceae							
					Honey plant		+
<i>Urtica dioica</i> L.	#	#	W	AP	Rubbed onto the mammaries of cows affected by the Evil-Eye		+
Urticaceae							
CAME 26262							
					Together with <i>Tanacetum macrophyllum</i> , this is rubbed onto goat mammaries on St. George's day (May 6 th) to improve milk production		+
					Hung on churns and stable doors on St. George's Day (May 6 th) as a good omen for dairy production		+
					Fodder		+
<i>Vicia ervilia</i> (L.) Willd.		Уров	C	Se	Fodder		+
Fabaceae							
<i>Zea mays</i> L.	#	#	C	Fr	Fodder, esp. for increasing the growth speed of lambs and for improving the coat of horses	+	+
Poaceae							
					Galactagogue for all animals		+
Diverse tree species			W; C	WA	Repellent against other insects in the bee hives		+
Not identified		Лула манушаче	W	FAP	Hung on home gates, churns and stable doors on St. George's Day (May 6 th) as a good omen		+
Not identified	Spenger		W	R	Inserted on the animal ear for treating diverse diseases		+

[§]: first record of the species in Albania.

In bold: folk taxa quoted by more than 40% of the informants.

C: cultivated; SD: semi-domesticated; W: wild.

*: past use.

#: see Table 1.

=: see Table 2.

+: recorded use.

Plant part(s) used: AP aerial parts; Br branches; Bu bulbs; BAFP Branches with flowering aerial parts; FAP flowering aerial parts; FB flowering branches; Fl flowers; Fr fruits; L leaves; R roots; Sa sap; Se seeds; St stems; T tubers; Wo wood; WA ashes from wood; WP whole plant.

a more “herbophilic” attitude among South-Slavs, as we have already postulated in previous cross-cultural comparative studies in the Western Balkans [26,46]. Moreover, since Macedonians were and also are those in the study area who trade/sell the largest share of wild crafted medicinal herbs to the nearby Albanian towns (i. e. Elbasan, Tirana) and markets or via Albanian middle men, their knowledge of these plants remains within their sphere of household economics. Thus, these activities may have delayed the decrease of local plant knowledge among this population.

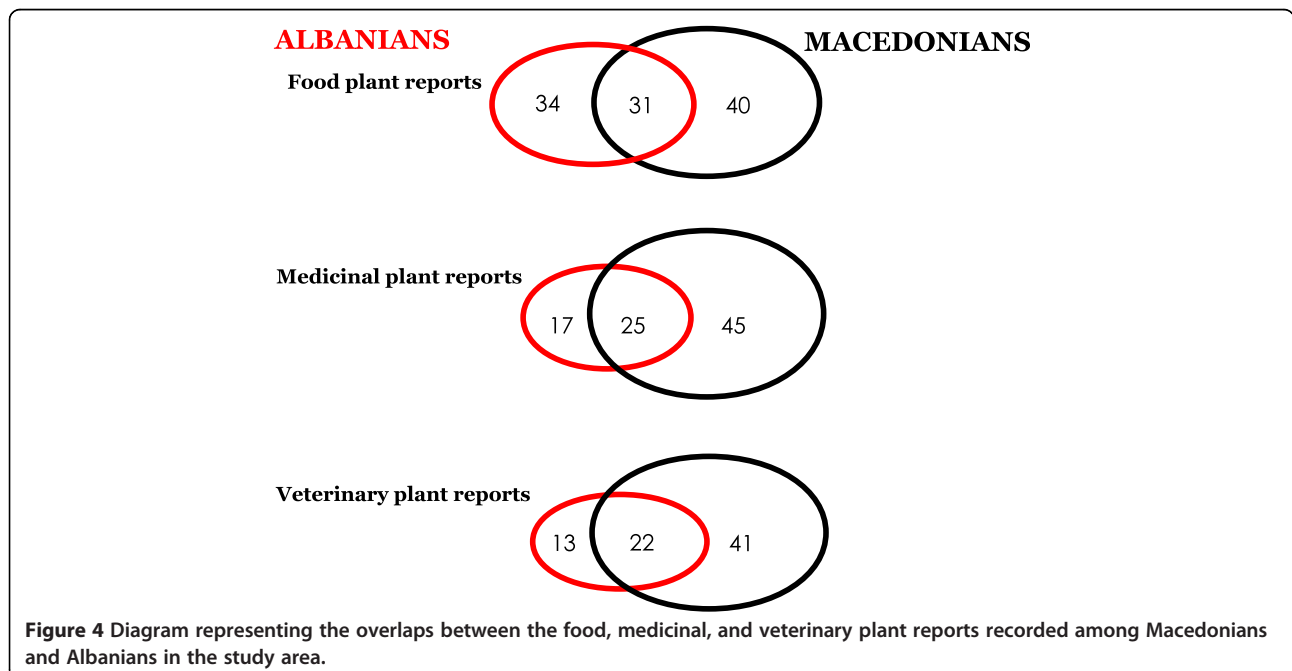
The plant reports found in common between the two communities are approx. one third of the overall recorded plant reports (Jaccard Index: 0.29). This would demonstrate some diverging trajectories of the ethnobotanies of the two groups, despite many years of living together in the same area and sharing the same religious faith. Nevertheless, these commonalities demonstrate how cultural edges are particularly significant in bio-cultural diversity [70].

The overlaps of the folk plant reports in the three considered domains (food, human medicine, and veterinary) are represented in Figure 4. In all three domains, the Jaccard Index measuring the similarity of the data sets collected among Albanians and Macedonians in Gollobordo is 0.29, although internal uses of medicinal plants (teas) and also ritual uses of veterinary plants made at *Georgyovden* seem to be much more relevant among Macedonians.

We recently applied the concept of resilience to migrants’ ethnobotanies [45], while defining resilience as the capability of socio-ecological systems to absorb

disturbances and to retain their basic structures and functions, which includes in particular four pillars [71]: 1) the capability of the systems of learning to live with change and absorb it; 2) of nurturing diversity for reorganisation and renewal; 3) of combining different kinds of knowledge for learning; and 4) of creating opportunities for self-organisation. The remarkable resilience evident in the Macedonian medical and veterinary ethnobotanies is indicative of a complex cultural adaptation processes that this community underwent. Moreover, the isolation of this community may related to the difficulties that Macedonians have experienced in accessing the mainstream Albanian culture and institutionalized health as well; the proof of this isolation can be seen in the generation of elderly women, who are the health care givers within the households and often still show difficulties in fluently speaking the Albanian language. Isolation could be ultimately seen then also as a kind of adaptive mechanism. This also shows how negotiations among diverse ethnic groups in mountainous areas could be linked to the practice of symbiotic relations and pluralism, as in the case studies of the Wakhi and Kyrgyz and Pashtu and Shugni of the Pamir [72,73].

In 1956, Fredrik Barth proposed for his field site in the mountains of Swat, North Pakistan, a path-breaking reflection for those times concerning the link between the use of certain ecological niches and ethnic boundaries [74]. According to his observations, the distribution of ethnic groups ecological niches is controlled by the distribution of species each group is able to exploit. Moreover, different ethnic groups may exploit the same ecological niche only if the weaker of them would be



better in using marginal environments. The history of Gollobordo's Macedonians in the last century seems to confirm this, since this group remained concentrated in the highest and more inhospitable village sites, while Albanians began to replace Macedonians in the villages located to lowest altitudes. The Macedonian group had to learn to make use of these marginal areas and the affiliated local resources, including the use of potato leaves for food and the reliance on several herbal medicines, in both the domestic arena and for trade. Although partly symbiotic, the relationship between the two communities has not been equal and the Macedonians have occupied the more marginalized socio-cultural niche.

Conclusions

Local environmental resources derived from plants continue to play an important role in the provision of dietary and medical care for both humans and their livestock in Gollobordo's communities. We could confirm a more *herbophilic* attitude of the Macedonians, especially with regards to medicinal and veterinary plants, while the overlaps between the Albanian and the Macedonian ethnobotanies are still relatively limited (restricted to a quarter of the overall recorded plant reports). This confirms that in Gollobordo, despite the two communities having shared the same religion and the same environmental space for many decades, the "original" TEK systems still persist, perhaps due to the geographical and cultural isolation of the area, especially with regards to the Macedonian community. Initiatives aimed at generating an endogenous rural development and especially at fostering sustainable gathering activities of local plants – as well as their small-scale trade and eco-tourism – should seriously consider these cultural divergences. This could in turn promote a tighter collaboration between the two communities and help to sustain the threatened linguistic and cultural heritage of the Macedonian minority.

Competing interest

The authors declare that they have no competing interest.

Authors' contribution

AP and KV conducted the field study and identified the plant samples. AP, AN, and CLQ analyzed the collected data; AH and BM contributed to the comparison with the Albanian ethnobotanical data; AN conducted the comparison with the Bulgarian ethnobotany and folklore; AP and CLQ wrote the manuscript and drafted the discussion. All authors read and approved the final manuscript.

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Author details

¹University of Gastronomic Sciences, Piazza Vittorio Emanuele 9, I-12042 Pollenzo, (Cuneo), Italy. ²School of Biosciences and Veterinary Medicine, University of Camerino, Via Pontoni 5, I-62032 Camerino, (Macerata), Italy. ³Department of Botany, University of Sofia, Blv. Dragan Tzankov, 1164 Sofia, Bulgaria. ⁴Department of Biology, University of Prishtina "Hasan Prishtina", Mother Teresa Str, 10 000 Prishtinë, Republic of Kosovo. ⁵Center for the Study of Human Health, Emory University, 550 Asbury Circle, Candler Library 107E, Atlanta, GA 30322, USA. ⁶Department of Dermatology, Emory University School of Medicine, 1518 Clifton Rd NE, CNR Bldg. 5000, Atlanta, GA 30322, USA.

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