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"I know a lot about medicinal plants. I read, I watch, and I search": towards hybrid knowledge systems in the modern era

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Abstract

Background Hybrid knowledge systems are central to community negotiations of environmental, social, and epistemic pressures. In multilingual borderland areas, interactions between local ecological knowledge (LEK), formal, and popular knowledge systems remain underexplored, despite their importance for the persistence and transformation of medicinal plant use today.

Methods We conducted 67 semi-structured interviews and participant observation in 21 rural settlements of the Vilnius region (Lithuania), an area bordering Belarus, focusing on the two largest local groups, Lithuanians (LT) and Poles (PL). Detailed Use Reports ($n = 1446$) on medicinal plant use were coded by the origin of knowledge, classified as local, formal, or popular, and the degree of hybridisation was quantified using the Shannon–Wiener diversity index and hybridisation metrics. Sociodemographic variables (age, gender, education, and multilingualism) were tested for associations with hybridisation using Spearman's ρ and Student's *t*-tests.

Results A total of 139 medicinal taxa were recorded, of which 68 (49%) were shared between the two groups. Overall, recorded medicinal plant knowledge remained primarily grounded in LEK, sustained through intergenerational transmission. Compared with PL, LT interviewees drew on a broader mix of knowledge-origin domains ($H' = 0.97$ vs 0.52) and combined them more often (HD = 0.195 vs 0.059). In total, 39 taxa showed hybrid use, predominantly in the LT group. Hybridisation was negatively associated with age but positively correlated with the number of listed plants and their reported uses, while multilingualism showed a near-significant positive trend.

Conclusions The study suggests that medicinal plant knowledge has evolved here through hybridisation, a process whose consequences are context-dependent, offering opportunities for revitalisation but also a risk of displacement. Dialogic exchanges across families, communities, languages, and media expand people's plant repertoire and strengthen community adaptive capacity. Yet when these exchanges lead to excessive standardisation, they risk eroding the diversity of local traditions. Ethnobotanical research must therefore go beyond documenting popular

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and formal knowledge sources to interrogate how linguistic and sociopolitical contexts condition the emergence of hybrid knowledge systems, privileging certain forms while rendering others transformed or marginalised.

Keywords Degree of hybridisation, Dzūkija, Formal knowledge, Knowledge diversity, Knowledge transmission, Knowledge systems, Medicinal plants, South-eastern Lithuania, Local ecological knowledge

Background

Contemporary societies face what has been called a *polycrisis*: environmental decline, political turbulence, and uncertainty about knowledge systems reinforce one another [13]. In this context, the ways in which local ecological knowledge (LEK) circulates and persists are being reshaped [16]. Beyond globalisation and climate shocks, the rise of digital media and shifts in governance introduce new channels, authorities and metrics of credibility for local knowledges [7]. In various marginal contexts, such shifts change *how* people value and recognise plant expertise, which remains vital for the health and resilience of local communities [28]. Medicinal plant knowledge is especially exposed to these dynamics because it is rooted in embodied practice, intergenerational memory, and locally embedded systems of care [72]. How such knowledge is remembered, adapted, or forgotten cannot be separated from broader regional trajectories of economy and politics [17].

Hybridisation has been identified as a key driver of both change and continuity in local knowledge systems [21]. In this study, knowledge hybridisation is conceptualised as a dynamic process through which elements from different knowledge domains, such as local, scientific, and popular knowledge, are combined, reinterpreted, and recontextualised in practice. Consistent with this, Yanou et al. [74] document a mixed picture in which certain LEK elements decline, whereas others persist by incorporating outside knowledge. However, Sharifian et al. [62] highlighted that little is known about LEK hybridisation processes. Where hybrid forms are documented, such as across different types of pastoral mobility and specific knowledge domains, the evidence is fragmentary, and patterns are inconsistent. Despite growing interest in knowledge hybridisation, systematic analyses of how local, formal, and popular epistemologies interact are still scarce [10, 35, 67], especially via digitally mediated, informal channels in multilingual, post-socialist regions.

One necessary consequence is that knowledge hybridisation, in response to historical and contemporary pressures, has become a key strategy through which local communities negotiate complex epistemological landscapes [78]. Often, practitioners have adapted known remedies to meet emerging conditions while also developing new medicines in response to novel challenges: *"new practices for new problems"* [75]. Rather than signalling cultural decline [38], such a blend of local, formal, and popular knowledge systems often reflects deliberate, situated, and context-specific strategies for navigating shifting social-ecological dynamics [76].

Rather than treating knowledge traditions as historically autonomous, we emphasise their longstanding entanglement [45]. With the growing authority of educational, medical, and regulatory institutions, plant knowledge became shaped by more standardised frameworks. In 19th- and 20th-century Europe, people continued to rely on longstanding vernacular traditions of healing, yet plant use was increasingly redirected through formal schooling, professional medicine, and state-led classification systems [48]. By the mid-1900s, written sources such as herbals, school textbooks, technical manuals, and popular literature had become the dominant repositories of botanical knowledge [36]. Regional differences in the use of medicinal plants have gradually weakened due to the spread of formal public education and the adoption of binomial nomenclature, which has made it easier to create standardised botanical knowledge frameworks [31, 54].

The use of medicinal plants in the Vilnius region and surrounding areas has been well-documented by Lithuanian scholars [32, 33, 50, 58, 66, 73]. However, much less is known about how these traditions have hybridised across ethnic groups under contemporary conditions.

After WWII in the Vilnius region, as in the wider western borderlands of the former Soviet Union, knowledge homogenisation processes were reinforced by centralised institutions, including the public education system, state healthcare, and official pharmacies [5, 41, 42]. In the studied region, the collection of medicinal plants was placed under state supervision. Authorities organised seasonal campaigns, assigned quotas to local communities, and prescribed which species were considered medicinal in the official pharmacopoeias. These measures did not only structure the work of foragers but also limited standard practices [9, 11] and reduced the diversity of local plant knowledge [58].

Building on recent debates [12, 35, 38], we approach hybridisation as a complex and context-sensitiveprocess whose consequences are not intrinsically beneficial or detrimental. While mutual learning and cross-fertilisation (e.g., through dialogic knowledge co-production) may lead to expansion or reconfiguration of knowledge content, practices and repertoires [68], this does not necessarily imply an increase in epistemic diversity in the strict sense. At the same time, hybridisation can facilitate epistemic homogenisation [49] when one knowledge

system comes to dominate and redefine the standards of credibility and legitimacy [63]. These ambivalences are not unique to the present but resonate with longer historical trajectories, as plant-related knowledge has long been produced, transmitted, and validated through shifting configurations of authority across generations.

This study advances a nuanced understanding of knowledge hybridisation by examining how LEK, formal, and popular epistemologies intersect in shaping contemporary medicinal plant use. Drawing on fieldwork in the Lithuanian-Belarusian borderland, a historically multilayered region, we analyse how hybrid forms of medicinal plant knowledge take shape among the two largest local ethnic groups, Lithuanians and Poles. Specifically, we aim to (1) document existing medicinal plant knowledge, (2) compare knowledge content, sources, and transmission pathways across ethnic groups, and (3) assess the degree and character of hybridisation in relation to key sociodemographic variables.

Materials and methods

Study site

Our fieldwork took place in the Vilnius region (Lithuania), close to the Belarusian border (Fig. 1). It was conducted as a part of a broader investigation of ethnobotanical and ethnomedicinal knowledge in the western borderlands of the former Soviet Union [41, 42, 55–57].

This area marks a transition zone between the central Lithuanian lowlands and the western Belarusian uplands, with altitudes varying from about 120 to 240 m and in places rising to nearly 300 m above sea level (locally reaching up to ~ 294 m). The environment is characterised by sandy, low-fertility soils, extensive peatlands and wetlands [39]. The climate is humid continental (Köppen Dfb), with a mean annual temperature of ~ 7.2 °C and mean annual precipitation ranging from 685 mm (Vilnius) to 701 mm (Šalčininkai) [19]. Forest cover in the region is extensive, with pine and mixed stands occupying more than half of the territory. According to Juknelienė and Mozgeris [26], the largest expansion of new forests in the second half of the twentieth century took place here. At the same time, the Šalčininkai municipality underwent considerable deforestation, illustrating how contrasting land-use processes can coexist within the same landscape. These shifts in forest cover are directly relevant for ethnobotanical practices, altering the accessibility and abundance of medicinal species gathered in forests, meadows, and wetland margins.

Historically, this territory was subject to numerous shifts in political affiliation over the last millennium [25]. The Vilnius region is defined as *Vilnija* or *Vilniaus kraštas* in Lithuanian or *Wileńszczyzna (Vilenščyna)* in Polish and Belarusian historiographies [69]. Within Lithuanian ethnographic discourse, however, this same area is more often associated with *Dzūkija*, a cultural–geographical region institutionalised during the Soviet period [69]. Its borders were largely drawn to coincide with those of the former Vilnius region [8]. Historically, however, the area extended beyond present-day Lithuania to include parts of what are now Belarus and Poland. The prominent "peninsula" of Lithuanian territory, which Belarus nearly encircles, is a distinctive feature of this landscape.

The studied settlements were predominantly rural and dispersed, with a relatively low population density. Proximity to Vilnius, the capital of Lithuania, added another layer of socio-ecological complexity to the study area. In the nineteenth century, Vilnius was a major centre

Fig. 1 Characteristic views of the study site, illustrating ecological and cultural conditions (from left to right): coniferous forest, rural road through fields, traditional homestead with cattle, vernacular cottage garden, roadside cross as a long-standing Roman-Catholic tradition of sacral markers in the countryside, and mural in a local Polish-language school (*"Przez oświatę do wolności i szczęścia"* ["Through education to freedom and happiness"]). Photo credits: JP, 2018–2019

for medicinal plant harvesting and the wholesale trade [30, 44]. The study region thus lies at a liminal interface between state-driven modernisation and enduring local traditions [61]. In the 1980s, many residents worked or studied in Vilnius during the week but returned to the villages on weekends and holidays. This rural–urban mobility pattern sustained local ecological practices and supported the preservation of LEK despite growing socioeconomic entanglement with the metropolitan core.

The region has long been characterised by the coexistence of multiple ethnic groups, languages, and cultural traditions, including Lithuanian, Polish, Belarusian, Jewish, Romani, Tatar, and Russian, among others. Although different ethnic groups may rely on overlapping epistemic principles, their long-term coexistence in the region has contributed to plural, historically layered practices and interpretations of human–environment relations [20].

Data collection

A total of 67 deep semi-structured interviews were conducted across 21 rural settlements of the Vilnius region between July 2018 and September 2019. Sampling targeted the two most represented ethnic groups in the area: Lithuanians (LT) and Poles (PL), using convenience sampling supplemented by snowball sampling where possible.

The gender distribution was skewed in favour of women (50 women, 17 men). It reflects common demographic trends in many post-Soviet societies [71], where male life expectancy remains significantly lower than that of females. Study participants ranged in age from 39 to 97 years. The mean age was about 69 years (65 years for LT ($n = 30$) and 71 years for PL ($n = 37$)).

The majority of interviewees (49 out of 67) spoke two or more languages, indicating that multilingualism was a common characteristic among them. The average number of languages reported by interviewees was 2, with LT showing greater linguistic diversity (mean = 3) than PL (mean = 2). Five LT and two PL interviewees stated that they were proficient in four languages. Common language combinations included Lithuanian (with regional forms such as dzūkiškai), Belarusian (with phrases like "po prostu" [simply], "po swojemu" [in one's own way], and "pa tutejszamu" [in the local way]), and Russian among LT, as well as Polish and Russian among PL.

In terms of educational level, the largest group had completed post-secondary non-tertiary ($n = 25$), followed by those with primary ($n = 19$), upper secondary ($n = 12$), and lower secondary ($n = 10$). Only one interviewee reported an equivalent tertiary education level. All interviewees identified themselves as Roman Catholics.

We conducted interviews in the language(s) preferred by the participants. The first and fourth authors' competencies made this multilingual approach possible, encouraging more complete responses and an open exchange of knowledge and experiences. In most cases, interviewees naturally switched between languages to choose the one that best suited their needs, particularly when discussing local and scientific plant names as well as local, formal, and popular uses. The interviews were transcribed with linguistic nuances, ensuring that all culturally embedded elements of speech were accurately captured for further interpretation and analysis.

Interviewees were asked to name and describe the plant species they currently or previously foraged or cultivated for medicinal purposes, the ailments treated with these plants, and the corresponding methods of preparation. In addition, information was collected on the sources of medicinal plant knowledge and on whether plant use referred to past or present practices. When possible, we gathered plants together with interviewees to collect and identify voucher specimens. Most interviewees noted they only knew plants by their local names, not their scientific or common names. In some cases, interviewees could not recall plant names but provided descriptions or pointed to them, allowing reliable identification. Collected specimens and dried samples are housed at the Herbarium of Ca' Foscari University of Venice in Italy (DZULT01–DZULT137; DDZULT01–DDZULT42). Plant identification was carried out using the Plants of the World Online database [52] and Flora Europaea [70], with family classification following [64].

Data analysis

The data were compiled and categorised according to the medicinal uses of plants. We structured the emic categories into Detailed Use Reports (DUR), each documenting the medicinal use, plant part, preparation method, the Latin and local names, time of use, knowledge origin, and codes for the interviewee's region and ethnic group.

To evaluate the degree of similarity in medicinal plant knowledge between compared ethnic groups, we calculated the Jaccard Index (*JI*) following González-Tejero et al. [22], based on the presence/absence of reported plant uses. The index was computed using the formula $JI = \frac{\gamma}{\alpha+\beta-\gamma}$, where α is the total number of plant uses reported by LT, β is the total number of plant uses reported by PL, and γ is the number of plant uses shared by both groups.

Knowledge origin categories were developed inductively from interviewee narratives and divided into three domains: local (A), formal (B), and popular (C). Within each domain, several subcategories captured specific pathways of knowledge transmission (e.g., intergenerational oral transfer, formal education, social media). The coding scheme is outlined in Table 1.

Table 1 Knowledge origin, description of categories

Subcategory	Description	Examples from interviews
A-Local Knowledge		
A1 Intergenerational family transfer	Transmitted mainly orally from parents, grandparents, or close relatives	"*I learnt it* ***from my father***." "***My grandmother*** *did it, my mother did it, and now I do it too*"
A2 Horizontal community transition	Learnt from elders, peers, or respected local figures, but not relatives	"***Our neighbour*** *told me that this helps a lot". "The* ***old women in our village*** *always used this plant for wounds"*
A3 Oblique transmission (elders/teachers)	Knowledge received from older, non-kin community members or local experts (e.g., teachers, local healers/herbalists)	*"At school,* ***our teacher*** *explained the healing plants to us." "The local herbalist told me this works for coughs"*
A4 Historical/ancestral roots	Framed as time-tested or long-standing knowledge with profound historical continuity	"*This is traditional knowledge* ***passed down for generations***". ***"****This is how it has* ***always been done*****"**, *"This knowledge has been known* ***for centuries****". "This has been* ***known for ages****"*
A5 Own practice/experimentation	Acquired through individual practice, observation, or trial-and-error	*"I figured it out* ***myself by trying*** *different things". "I* ***experimented*** *with this plant"*
B-Formal Knowledge		
B1 Formal publications	Scientific, peer-reviewed, expert-validated herbals or monographs	"*I* ***read*** *it in a* ***medicinal book****". "It was written in a scientific article I read"*
B2 Health professionals	Information or recommendations from certified practitioners	"***My doctor*** *recommended this"*
B3 School/university instruction	Knowledge obtained through formal education	*"We remember this* ***from school****"*
B4 Digital medical resources	Research-based content on medical websites or portals	*"I looked it up on* ***a medical website****". "I googled it and found this information on* ***a special medicinal portal****"*
C-Popular Knowledge		
C1 Newspapers/magazines	General audience press, local or specialised	*"I read this i****n one local magazine****". "I specifically subscribed* ***to a local newspaper*** *dedicated to traditional medicine"*
C2 Radio/TV	Mass-media programs	*"I have seen it on* ***a morning TV show****"*
C3 Social media and popular websites	Facebook groups, Instagram, forums, YouTube	*"I saw this information* ***in one popular online forum*** *and decided to try it". "I have seen it* ***on YouTube."***

The **degree of hybridisation** (HD) is defined as the proportion of use reports that draw on more than one knowledge-origin domain (AB, AC, BC, or ABC) relative to the total number of use reports. For each plant species and ethnic group, *HD* was calculated as:

$$HD = \frac{Number\ of\ hybrid\ use\ reports}{Total\ number\ of\ use\ reports} \quad (1)$$

To enable cross-ethnic comparison of hybridisation patterns, this metric was calculated separately for LT and PL. HD = 1 corresponds to full hybrid knowledge of plant uses, while HD = 0 indicates a singular and consistent source.

Each DUR was associated with a binary code: 0 for non-hybrid (citing exactly one knowledge origin: A, B, or C) and 1 for hybrid (citing ≥ 2 origins: AB, AC, BC, or ABC). We also calculated the **internal degree of hybridisation** within each general knowledge origin (A, B, or C), defined as the proportion of use reports that included multiple subcategories (e.g., A1, A3, and A4). These were coded analogously (1 = internally hybrid, 0 = internally non-hybrid), and the proportion was computed using the definition of HD in Eq. 1. A plant is considered fully hybridised (ABC) only when supported by at least two DUR for that taxon explicitly combining all three knowledge domains.

To assess **the diversity of knowledge origins** within and between studied ethnic groups, per taxon or medicinal use, we computed the Shannon–Wiener diversity index (*H′*) over distinct origin categories [46]:

$$H\prime = -\Sigma_{i=1}^{s} p_i ln\,(p_i) \quad (2)$$

where *S* is the total number of different origin categories (e.g., knowledge origin types), p_i is the proportion of the total number of medicinal uses in the *i*-th category, and *ln* denotes the natural logarithm. This index enabled us to assess the heterogeneity of knowledge systems by capturing the richness and distribution of knowledge across origin types within and between the sampled ethnic groups. We used Spearman's rank correlation coefficient to assess whether sociodemographic variables (age, gender, education, the number of languages spoken) were associated with the degree of hybridisation. This helped us to identify patterns and potential drivers behind the emergence and distribution of hybrid knowledge systems in the study region. The group differences were assessed using Student's *t*-test (robustness confirmed with Wilcoxon rank-sum tests).

All statistical analyses and visualisations were conducted using R v. 4.5.0 [59] and PAST 5 [27].

Results

Medicinal plant knowledge diversity

We recorded 139 taxa belonging to 58 botanical families used for healing and prophylactic purposes (Table 2). The most represented were Asteraceae (21), Rosaceae (16), Lamiaceae (11), Ericaceae (7), Apiaceae (6), and Poaceae (5). Of these, 118 taxa were documented among the LT and 89 among the PL interviewees. Ultimately, 68 plant species (49%) were common to both ethnic groups. In total, 1446 DUR were collected.

The amount of reported medicinal plant uses differed significantly between the studied ethnic groups. LT interviewees named a higher number of DUR (mean ± standard deviation (SD) = 28.0 ± 21.4) than PL interviewees (16.4 ± 16.0); Student's $t = 2.458$, $p = 0.017$, $n = 67$. This finding indicates a broader repertoire of medicinal applications among LT. These quantitative differences are further contextualised by cross-ethnic patterns of overlap (Fig. 2), which illustrate the Jaccard indices and proportional Venn diagrams of medicinal taxa cited by LT and PL interviewees, including those mentioned by at least three people.

Approximately 80% of reported uses involved wild plants, while cultivated species constituted approximately 18%. The LT group mentioned a higher number of taxa overall in both the wild and cultivated categories. In both groups, wild resources were used more extensively for healing and prophylactic purposes than cultivated ones.

The most frequently mentioned taxa used among all interviewees included *Artemisia absinthium* (87 DUR), *Rubus idaeus* (79), *Matricaria chamomilla* (67), *Calendula officinalis* (57), *Achillea millefolium* (52), and *Tilia cordata* (47), with examples of use shown in Fig. 3. LT most frequently cited *Artemisia absinthium* (49 DUR), *Rubus idaeus* (37), *Matricaria chamomilla* (36), *Calendula officinalis* (34), *Achillea millefolium* (31), *Tilia cordata* (26), *Betula* spp. (24), and *Carum carvi* (21). Among PL were recorded as mostly cited: *Rubus idaeus* (42), *Artemisia absinthium* (38), *Matricaria chamomilla* (31), *Vaccinium myrtillus* (28), *Calendula officinalis* (23), *Aloe* (22), *Achillea millefolium* (21) and *Tilia cordata* (21).

A comparison of the taxa mentioned by interviewees revealed a statistically significant gender difference (Spearman's $\rho = -0.295$, $p = 0.015$). Compared to male interviewees (9.9 ± 7.1), female interviewees reported significantly more taxa on average (mean ± SD = 14.9 ± 9.7). Other variables, however, did not exhibit any correlations. Our analyses indicated no significant relationship between age and medicinal plant knowledge (Spearman's $\rho = -0.112$, $p = 0.368$) or between multilingualism and such knowledge (Spearman's $\rho = 0.170$, $p = 0.168$). Educational level was also non-significant for the number of

Table 2 Medicinal plant knowledge diversity in the Vilnius region (Lithuania), as named and reported by members of the Lithuanian (LT) and Polish (PL) communities. DUR refers to the number of detailed use reports per plant taxon

Family	Latin name; voucher number	Local name(s)	Used part(s)	Preparation	Medicinal use	DUR	
						LT	PL
Acoraceae	*Acorus calamus* L.; DZULT080	LT: ajerai; ajeras PL: aer, ajeras	leaves	eaten fresh	appetiser		1
			roots	alcoholic infusion	bellyache		1
					healthy		1
				decoction	toothache	1	
				decoction, bath	hair care		1
					head lice	1	
				tea	appetiser		1
				topical application	toothache	1	
Amaranthaceae	*Beta vulgaris* L.	LT: burokas; PL: burak	leaves	topical application	abscesses	1	1
					wounds		1
			roots	eaten cooked	constipation	2	
				juice	improve blood quality	1	
				juice, to rinse	tonsillitis	1	
Amaryllidaceae	*Allium cepa* L.	LT: svogūnas; PL: cebula, cybula	bulbs	baked, topical application	abscesses	2	3
					cough		1
				boiled with milk	cough	1	1
				syrup, drops	earache	1	
					runny nose	1	
				topical application	earache		1
	Allium sativum L.	PL: čosnyk	bulbs	eaten fresh	runny nose		1
Apiaceae	*Aegopodium podagraria* L.	LT: garšva	young leaves	eaten fresh	healthy	1	
	Anethum graveolens L.; DZULT063, DDZULT29	LT: krop, krapai; PL: krapai	aerial parts	tea	hypertension	1	
			seeds	boiled with milk	hypertension	1	
				tea	headache	1	
					hypertension	5	1
	Carum carvi L.; DDZULT40	LT: kmynai, kmynas; PL: kmin, kminek, kmynas, kmin	seeds	alcoholic infusion	cold		1
					fever	1	
					flu		1
					stomach ache	1	
				decoction	for everything		1
					stomach ache		2
				tea	cold	1	1

Table 2 (continued)

Family	Latin name; voucher number	Local name(s)	Used part(s)	Preparation	Medicinal use	DUR	
						LT	PL
					cough	2	1
					diarrhoea	2	
					digestion problems	1	
					fever	3	
					flatulence	2	
					from losing weight	1	
					headache	1	
					healthy		1
					heart problems		1
					helpful		1
					hypertension	2	1
					immune boosting		1
					organism cleansing	1	
					sedative	1	
					stomach ache	2	
				with apple juice	stomach ache		1
	Daucus carota L.	LT: morka, PL: marchewka, morka	roots	boiled with milk, topical application	abscesses		1
				juice	gastric ulcer	1	
					heart rate	1	
				topical application	abscesses		1
			seeds	tea	hypertension		1
	Ostericum palustre (Besser) Besser	LT: starėdub	roots	alcohol maceration, topical application	joint pain	1	
	Petroselinum crispum (Mill.) Fuss; DDZULT08	PL: pietruszka, petražolės	aerial parts	decoction	urinary bladder		1
			leaves	decoction	kidney diseases		1
				tea	urinary bladder		1
Asphodelaceae	*Aloe* spp. (mainly *Aloe arborescens* Mill.)	LT: alijošius, aliaš, PL: aliasz, aloesz, aloje, staletnik, alijas, alijošius	leaves	alcoholic maceration	for everything		2
					gastric ulcer		1
					sore throat		1
					stomach ache		2
				eaten fresh	earache	1	
					for everything	1	

Table 2 (continued)

Family	Latin name; voucher number	Local name(s)	Used part(s)	Preparation	Medicinal use	DUR	
						LT	PL
				eaten fresh, mixed with honey	cough		2
					earache	1	
					flu	1	
					for everything	1	
					runny nose	1	
					stomach ache	1	1
				topical application	abscesses		1
					cuts		2
					inflammation processes		1
					wounds		2
			sap	drops	eye pain		1
					runny nose	1	1
					stomach ache		1
				fat-infused extract	duodenal ulcer		1
					pneumonia		1
					tuberculosis		1
				tincture	cough	1	
					for everything	1	
					runny nose		1
					wounds	1	
Aspleniaceae	*Gymnocarpium dryopteris* (L.) Newman; DDZULT16	LT: uročnikas; PL: uročnik, uročnikas, urocznik	aerial parts	fumigation	evil eye	1	4
					fright	2	3
				tea	evil eye		1
Asteraceae	*Achillea millefolium* L.; DZULT027, DZULT038, DZULT064	LT: kraujažolė, krivaunikas, krivaunykas; PL: kraujažolė, krewawnik, krwawnik, krywaunik, tysiačalistnik	aerial parts	decoction	women's diseases		1
				tea	anaemia	1	
					bleeding	1	
					improve blood quality	1	
					internal bleeding	1	
					liver diseases	1	
					organism cleansing	1	
					thrombus	1	
					women's diseases	2	

Table 2 (continued)

Family	Latin name; voucher number	Local name(s)	Used part(s)	Preparation	Medicinal use	DUR	
						LT	PL
				topical application	bleeding	1	1
			inflorescences	decoction	for everything		2
				tea	improve blood quality	1	
					internal bleeding		1
			leaves	decoction	abscesses		1
					stomach ache		1
				topical application	abscesses		1
					bleeding	11	10
					cuts	5	3
					wounds	4	
	Arctium tomentosum Mill.; DZULT116	LT: lapušnykai, varnalėša, vilkai, varnalėšos; PL: łapuch, łopuch	leaves	topical application	external pain	1	
					headache	2	
					joint pain	9	9
					knee ache	3	3
					limb pain	4	
					wounds	1	
			roots	decoction	stomach cancer		1
	Arnica montana L.	LT: trontnik	aerial parts	compress	leg strain	1	
	Artemisia abrotanum L.; DZULT077; DZULT129	LT: dievo medelis, diemedis, božje dreŭka	aerial parts	tea	women's diseases	2	
	Artemisia absinthium L.; DDZULT27, DZULT052, DZULT083	LT: černobilis, kietis, pelūnas, pelyna, pelynas, pelynas, kartusis kietis, pelyn, pialynas; PL: pałyn, pelynas, pialynas, piełun, piołun, połyń	aerial parts	decoction	appetiser	1	1
					bellyache	1	4
					diarrhoea	1	6
					for everything		1
					helminthic infection	1	
					prophylactics		1
					stomach ache		4
				fumigation	fright		1
				put in pillow	headache	1	
					sedative	1	
				tea	appetiser	2	
					bellyache	6	6
					diarrhoea	12	6
					digestion problems	6	2

Table 2 (continued)

Family	Latin name; voucher number	Local name(s)	Used part(s)	Preparation	Medicinal use	DUR	
						LT	PL
					gastritis		1
					healthy		1
					helminthic infection	3	
					intestinal pain	2	
					organism cleansing	1	
					pancreatitis	1	
					poisoning		1
					prophylactics	1	
					sedative in children	1	
					stomach ache	8	1
				tincture	stomach ache		1
				whisked in the sauna	healthy	1	1
	Artemisia spp.	LT: keresėliai	aerial parts	fumigation	evil eye	3	
	Artemisia vulgaris L.; DZULT079	LT: buralomas, černobilis, kietys paprastasis, bulniach	aerial parts	decoction, to rinse	sore throat	1	
					tonsillitis	1	
				tea	sore throat	1	
					fright	1	
	Bidens tripartita L.; DZULT073	LT: čarada, žydo blusos, lakišius; PL: čarada	aerial parts	decoction, bath	allergy	2	1
					diaper rash	2	
					skin diseases	1	1
				tea	allergy	1	1
					diaper rash	1	
	Calendula officinalis L.; DZULT019, DZULT041	LT: medetka, medetkos, nagietka, nahatki; PL: kalanduła, nagatki, nagietki, kalenduła, medetka	aerial parts	tea	for everything	1	
			flowers	alcohol maceration	sore throat	1	
					improve vision		1
				decoction	digestion problems		1
					for everything		2
					helpful		1
					sore throat		1
					stomach ache		1
					stomach ache in children		1
					urinary bladder		1
					weightlifting injuries		1
				decoction, bath	allergy	1	

Table 2 (continued)

Family	Latin name; voucher number	Local name(s)	Used part(s)	Preparation	Medicinal use	DUR	
						LT	PL
					diaper rash	1	
					diathesis in children	1	
					eye inflammation		1
					eye pain		1
					eye problems	2	
					inflammation processes	1	
				decoction, to rinse	abscesses		1
					sore throat		2
					tonsillitis	1	
				oil infusion	stomach ache	1	
				tea	allergy	1	
					bladder inflammation	2	
					blisters	1	
					cold	2	
					cough	2	
					diaper rash	1	
					digestion problems	1	
					for everything	1	
					hair care	1	
					headache		1
					helpful		1
					inflammation processes	5	
					kidney diseases	1	
					liver diseases		1
					organism cleansing	1	
					sore throat	1	1
					stomach ache	1	1
					urinary bladder	1	
					weightlifting injuries		1
					women's diseases	2	2
	Carduus spp.	LT: [forgotten name]	aerial parts	tea	fright	1	
	Cyanus segetum Hill; DDZULT31, DZULT110	LT: rugiagėlė, rugiagėlės, vosilkos	aerial parts	tea	for everything	1	
					inflammation processes	1	

Table 2 (continued)

Family	Latin name; voucher number	Local name(s)	Used part(s)	Preparation	Medicinal use	DUR	
						LT	PL
			inflorescences	tea	bladder inflammation	1	
					heart rate	1	
					pneumonia	1	
					sedative for children	1	
					urinary inflammation	1	
	Echinacea purpurea (L.) Moench	LT: ežiuolė	flowers	tea	immune boosting	1	
	Helianthus annuus L.	PL: padsołnuch	roots	tea	healthy		1
	Helichrysum arenarium (L.) Moench; DZULT134, DDZULT37, DDZULT06	LT: cosankos, šlamutis, snaudės; PL: suchawiejka	aerial parts	decoction	liver diseases		2
				tea	helpful	1	
					liver diseases	1	
			flowers	tea	improve blood quality		1
					liver diseases	1	
					sleep disturbance	1	
			roots	tea	stomach ache	1	
	Inula helenium L.; DZULT078, DZULT097	LT: debesylas, deviasylas, debesylas didysis; PL: dziewiasił, dziwiasił	roots	alcohol maceration, topical application	bruises	1	
					tonic	1	
					joint pain	2	
					weightlifting injuries	2	
				alcoholic infusion	back pain		1
					for everything		2
					joint pain	2	2
					uterine prolapse		1
					weightlifting injuries	1	
				decoction	back pain		1
					for everything		1
					joint pain		1
				tea	bellyache	2	
					external pain	1	
					weightlifting injuries	1	
				tincture	healthy	1	
					weightlifting injuries	1	
	Matricaria chamomilla L.; DDZULT26, DZULT036, DZULT059, DDZULT07	LT: ramunėlės; PL: ramaška, rumianački, romashka, rumianek, ramunėlės, rumianki, rumiańki	aerial parts	alcoholic infusion	cold		1
				compress	diaper rash	2	
					eye inflammation	1	1

Table 2 (continued)

Family	Latin name; voucher number	Local name(s)	Used part(s)	Preparation	Medicinal use	DUR	
						LT	PL
					eye pain		1
					eye problems	2	
					healthy	1	
					neck pain	1	
					sore throat		1
					wounds	1	
				decoction	bellyache in children		2
					eye pain	1	
					healthy		1
					helpful		1
					improve vision		1
					sore throat	1	
					stomach ache		1
				decoction, bath	abscesses		1
					diaper rash	1	
					diathesis in children	4	6
					eye problems	2	
					skin diseases	1	
				drops	earache	1	
					eye inflammation	1	
					eye pain	1	
				tea	bellyache		1
					cold	1	
					digestion problems	1	
					earache	1	
					fever	1	
					flatulence	1	
					for everything		1
					healthy		3
					helpful	1	2
					runny nose	1	
					sedative	1	
					sore throat	2	
					stomach ache	1	
			inflorescences	decoction	for everything		1
					inflammation processes		1
				decoction, bath	abscesses		1

Table 2 (continued)

Family	Latin name; voucher number	Local name(s)	Used part(s)	Preparation	Medicinal use	DUR	
						LT	PL
				decoction, to rinse	sore throat		1
				tea	bellyache in children		1
					digestion problems	1	
					healthy	1	2
					headache	1	
					inflammation processes	1	
	Scorzoneroides autumnalis (L.) Moench	PL: małačaj	aerial parts	decoction	for heart		1
					sore throat		1
	Silybum marianum (L.) Gaertn.; DZULT121	LT: čertapalakas, čiartapaloch; PL: čartapałoch, czartapaloch	aerial parts	decoction, bath	fright		1
				fumigation	fright	1	
			flowers	fumigation	fright		3
			leaves	decoction	fright	1	
	Tanacetum vulgare L.; DZULT066	LT: pižma, bitkrėslė; PL: pižma	aerial parts	decoction	haemorrhoids		1
					healthy	1	
					organism cleansing		1
				whisked in the sauna	healthy	1	
			inflorescences	decoction	helminthic infection	1	
	Taraxacum officinale (L.) Weber ex F.H.Wigg.; DZULT094	LT: pienė; PL: adywanczyk	inflorescences	alcohol maceration, topical application	joint pain	1	
				tea	cough		1
					for everything		1
			leaves	eaten fresh	liver diseases	1	
			roots	tea	liver diseases	1	
			sap	topical application	warts		1
	Tussilago farfara L.; DZULT108, DDZULT04	LT: mać-mačecha, šaltapusnis, šalpusniai, padbielas; PL: mać-mačecha	inflorescences	alcoholic infusion	joint pain	1	
				tea	cold	2	
					cough	1	
			leaves	decoction	bellyache		1
					cough		2
					helpful		1
				tea	bronchitis	1	

Table 2 (continued)

Family	Latin name; voucher number	Local name(s)	Used part(s)	Preparation	Medicinal use	DUR	
						LT	PL
					cold	1	
					cough	2	
					sore throat	1	
				topical application	joint pain	1	
					wounds		1
Betulaceae	*Alnus* spp.	LT: alksnis; PL: olcha	leaves	topical application	abscesses		1
					haemorrhoids	1	
	Betula spp. (including *Betula pendula* Roth, *Betula pubescens* Ehrh); DZULT013, DZULT050	LT: beržas; PL: brzoza, beržas, biaroza, bierjeza	buds	tea	diuretic	1	
					kidney diseases		1
			leaves	tea	diuretic	1	
					kidney diseases		1
				topical application	joint pain	1	
					limb pain	1	
			twigs with leaves	decoction, bath	allergy		1
					gout	1	
					radiculitis	1	
					rheumatic pains	1	
				tea	for everything	1	
				whisked in the sauna	cold		1
					healthy	16	11
					helpful		1
					radiculitis		1
	Corylus avellana L.	LT: lazdynas	twigs with leaves	tea	for everything	1	
Boraginaceae	*Symphytum officinale* L.; DZULT045, DZULT070	LT: kaulažolė, živakost, živakostas, starodovas, riebešaknis, PL: žyvakost, żywokost	aerial parts	tea	bones cohesion	1	
			leaves	topical application	adhesion of bones	2	
			roots	alcohol maceration, topical application	adhesion of bones	1	
					joint pain	1	
				alcoholic infusion	adhesion of bones		1
					bones cohesion	1	
					gastric ulcer	1	
					joint pain	2	2

Table 2 (continued)

Family	Latin name; voucher number	Local name(s)	Used part(s)	Preparation	Medicinal use	DUR	
						LT	PL
					limb pain	2	
				compress	adhesion of bones	1	
					bones cohesion	1	
				decoction	adhesion of bones	1	
					stomach ache	1	
				eaten fresh	adhesion of bones	1	
				tea	adhesion of bones		1
					bones cohesion	1	
				topical application	adhesion of bones	1	
Brassicaceae	*Armoracia rusticana* G. Gaertn., B. Mey. & Scherb.; DZULT022	PL: chren	roots	alcoholic infusion	joint pain		1
	Brassica oleracea L.	LT: kopūstas; PL: kapusta	leaves	fresh, topical application	abscesses	1	
					headache	1	1
					joint pain	2	2
					knee ache	1	2
					mastitis	1	
	Capsella bursa-pastoris (L.) Medik.; DZULT024	LT: triskiautė žvakidė, žvaginė; PL: pastušja sumka	aerial parts	decoction	stomach ache		1
					women's diseases	2	1
					organism cleansing	1	
Campanulaceae	*Campanula* sp.; DZULT092	LT: skambaliukai	roots	tea	stomach ache	1	
Cannabaceae	*Cannabis sativa* L.; DZULT102	LT: kanapė	aerial parts	whisked in the sauna	healthy	1	
Caprifoliaceae	*Valeriana officinalis* L., DZULT054	LT: valerijonas; PL: valerijonas, valerjana, valerjanka, walerjana	aerial parts	tea	for heart		1
					sedative	1	1
				tincture	for heart		1
			roots	decoction	heart problems	1	
					sedative	2	1
				tea	for heart	1	1
					hypertension	1	
					sedative	3	1
					to calm the heart	1	
				tincture	for heart	1	2
					heart problems	1	
					sedative	1	3

Table 2 (continued)

Family	Latin name; voucher number	Local name(s)	Used part(s)	Preparation	Medicinal use	DUR	
						LT	PL
			whole plant with roots	tea	for heart	1	
Caryophyllaceae	*Silene latifolia* subsp. *alba* (Mill.) Greuter & Burdet; DZULT071, DDZULT39	LT: ochvatas, ochvatnikas	aerial parts	decoction, bath	skin diseases	1	
				tea	skin diseases	1	
	Silene vulgaris (Moench) Garcke; DDZULT21, DZULT115	LT: ochvatas, pliaukštūnai; PL: ochvatnik	aerial parts	decoction, bath	allergy	1	
				tea	allergy	1	
					bladder inflammation	1	
					kidney diseases	1	
					urinary bladder		1
			flowers	tea	urinary inflammation	1	
	Stellaria media (L.) Vill	LT: žliūgė	aerial parts	compress	external pain	1	
Celastraceae	*Parnassia palustris* L.	LT: [forgotten name]	whole plant with roots	tea	for heart	1	
Commelinaceae	*Callisia fragrans* (Lindl.) Woodson	PL: załaty wus, zołotoj us	aerial parts	alcoholic infusion	joint pain		1
					lung diseases		1
			leaves	alcohol maceration, topical application	abscesses		1
					wounds		1
Crassulaceae	*Kalanchoe* spp.	LT: paleistuvė, kalankė	leaves	drops	runny nose	1	
Cucurbitaceae	*Cucumis sativus* L.	LT: agurkas	fruits	juice	improve blood quality	1	
Cupressaceae	*Juniperus communis* L.; DZULT001	LT: ėglis, eglynas, jieglis, kadagys, kadugys, jalaviec	fruits	eaten fresh	bronchitis	1	
					lung diseases	1	
				tea	stomach ache	1	
					urinary inflammation	1	
			roots	alcoholic infusion	blood vessels	1	
			twigs with spikes	decoction, bath	gout	1	
					jaundice	1	
					rheumatic pains	1	
				tea	jaundice	1	
				whisked in the sauna	healthy	5	
					promotes bloodstream	1	
	Thuja spp.; DZULT012	LT: tuja	twigs with leaves	decoction	sleep disturbance in children	1	
				decoction, bath	sleep disturbance in children	1	

Table 2 (continued)

Family	Latin name; voucher number	Local name(s)	Used part(s)	Preparation	Medicinal use	DUR	
						LT	PL
Cyperaceae	*Eriophorum* spp.	LT: [forgotten name]	whole plant with roots	tea	facial nerve inflammation	2	
Dennstaedtiaceae	*Pteridium aquilinum* (L.) Kuhn	LT: paparčiai	fronds	decoction, bath	haemorrhoids	1	
Elaeagnaceae	*Hippophae rhamnoides* L.	LT: šaltalankis; PL: ablapicha	fruits	juice	healthy	1	
				tea	stomach ache		1
Equisetaceae	*Equisetum arvense* L.; DDZULT03, DDZULT19	LT: dirvinis asiūklis; PL: chvošč, chwoszcz polewy	aerial parts	decoction	kidney diseases		4
					urinary bladder		1
					urinary inflammation		1
				tea	healthy		1
					hypertension	1	
					organism cleansing	2	
					women's diseases		1
Ericaceae	*Arctostaphylos uva-ursi* (L.) Spreng	LT: meškauogės	leaves	tea	urinary bladder	1	
					women's diseases	1	
	Calluna vulgaris (L.) Hull; DZULT126	LT: viržis	flowers	tea	heart problems	1	
					helpful	1	
					tonic	1	
	Chimaphila umbellata (L.) W.P.C.Barton	LT: parūšainė, parūšainikas, stanaunykas; PL: paruszeniec	aerial parts	alcoholic infusion	back pain		1
				tea	back pain		1
					men diseases	1	
					weight lifting injuries	2	
					women's diseases		1
			flowers	tea	weightlifting injuries		1
					women's diseases		1
	Rhododendron tomentosum Harmaja; DDZULT30	LT: baūnas, gailius; PL: bahulnik	aerial parts	decoction, bath	gout	1	
					joint pain		1
					radiculitis	1	
					rheumatic pains	1	
	Vaccinium myrtillus L.; DZULT100	LT: mėlynės, juodos uogos, PL: čarnicy, czarne, czarnice, čarničnik, chernika, czernicznik, mėlynės	aerial parts	decoction	helpful		1
					improve vision		1
					stomach ache		1
				tea	diabetes	1	
					diarrhoea	1	
					for everything		1

Table 2 (continued)

Family	Latin name; voucher number	Local name(s)	Used part(s)	Preparation	Medicinal use	DUR	
						LT	PL
			fruits	alcoholic infusion	eye problems		1
					improve vision		1
				compote	bellyache in children		1
				decoction	stomach ache		1
				eaten dried	bellyache in children		1
					diarrhoea	2	6
					digestion problems		1
				eaten fresh	constipation	1	
					healthy	1	
					hypertension		1
					improve vision		6
				frozen	healthy	1	
				jam	diarrhoea	2	
					hypertension		1
					improve vision		1
				raw jam	diarrhoea		1
				tea	bellyache	1	
					diarrhoea	2	1
			leaves	tea	diabetes	1	1
					enuresis	1	
					headache	1	
					healthy	1	
	Vaccinium oxycoccos L.	LT: spanguolė; PL: žurawiny	fruits	eaten fresh	anaemia	1	
					hypertension	1	1
				raw jam	hypertension	1	
			leaves	tea	cold	1	
					healthy	1	
					vitamin C	1	
	Vaccinium vitis-idaea L.; DZULT106	LT: bruknės, brukneuogės, bruknojai; PL: bruśničnik, jagodnik, bruknės, brusnicznik	aerial parts	decoction	antiseptic		1
					joint pain		1
					urinary bladder		1
				tea	for everything		1
					kidney diseases		1
			fruits	eaten dried	diarrhoea	1	
				eaten fresh	healthy	1	
				jam	cough	1	
					healthy	1	

Table 2 (continued)

Family	Latin name; voucher number	Local name(s)	Used part(s)	Preparation	Medicinal use	DUR	
						LT	PL
				juice	bronchitis	1	
					cough	1	
					vitamin C	1	
				tea	cold	1	
					enuresis	1	
					for everything		1
					healthy	1	
					vitamin C	1	
			leaves	tea	bladder inflammation	1	
					liver diseases	1	
					organism cleansing	1	
					urinary bladder	1	1
					urinary inflammation	1	
					weightlifting injuries		1
					women's diseases		1
			roots	tea	women's diseases		1
Fabaceae	*Anthyllis vulneraria* L.	LT: [forgotten]; PL: piarestup, przelot	aerial parts	decoction	fright	1	1
			flowers	decoction	fright	1	1
	Trifolium spp. (including *Trifolium pratense* L.); DZULT039, DZULT112, DDZULT34	LT: dobilas, dobilas raudonas, raudoni dobilai; PL: kaniušyna, klevier, koniuszyna czerwona	flowers	decoction	raised level of cholesterol		1
				tea	bronchitis	1	
					cough	1	
					fever		1
					healthy	2	
					heart problems	1	
					men's diseases		1
					sedative	2	
Fagaceae	*Quercus robur* L.; DZULT003, DZULT048	LT: dub, ąžuolas; PL: dąb, dub	bark	decoction	diarrhoea	1	1
			twigs	fumigation	evil eye	1	
			twigs with leaves	tea	for everything	1	
				whisked in the sauna	healthy	6	9
					helpful		1
Gentianaceae	*Centaurium erythraea* Rafn; DZULT110, DDZULT31	LT: širdelas, širdažolė, PL: centūra, centuryja	aerial parts	tea	healthy	1	
					heart problems	1	

Table 2 (continued)

Family	Latin name; voucher number	Local name(s)	Used part(s)	Preparation	Medicinal use	DUR	
						LT	PL
			flowers	decoction	helminthic infection		1
				tea	for heart	2	
			whole plant with roots	tea	cold		1
					for everything		1
					healthy		1
Geraniaceae	*Pelargonium* spp., DZULT065	LT: jeronimas	leaves	crushed leaf application	earache	1	
				drops	toothache	1	
Grossulariaceae	*Ribes nigrum* L.; DZULT033	LT: juodieji serbentai; PL: juodieji serbentai, smarodzina, smorodina	fruits	alcoholic infusion	hypertension		1
				eaten fresh	joint pain	1	
				jam	hypertension	1	
			leaves	decoction, bath	diathesis in children		1
				tea	cold	1	1
					fever		1
					gout	1	
					healthy		1
					hypertension	1	
					rheumatic pains	1	
					vitamin C	1	
Hypericaceae	*Hypericum* spp., including *Hypericum perforatum* L.; DZULT075, DDZULT20	LT: jonažolė, jonažolės, jonažolė paprastoji, sviantyjancky; PL: jonažolės, świentajanskaje zielle, świętojańskie, zelle swietojaskie, zwieraboj	aerial parts	decoction	diarrhoea		1
					digestion problems		2
					for everything		6
					helpful		1
				decoction, bath	diaper rash	1	
				tea	bellyache		1
					for everything	3	3
					healthy		1
					sedative	1	
					stomach ache	3	
				tincture	stomach ache		1
				oil infusion	for everything	1	
			flowers	alcohol maceration, topical application	bleeding	1	
					wounds	1	

Table 2 (continued)

Family	Latin name; voucher number	Local name(s)	Used part(s)	Preparation	Medicinal use	DUR	
						LT	PL
				alcoholic infusion, to rinse	periodontal disease	1	
				decoction	for everything		1
					stomach ache		1
				tea	aids	1	
					cough	1	
					for everything	1	
					herpes	1	
					stomach ache	1	
					tonic	1	
Lamiaceae	*Lamium album* L.; DZULT084	LT: baltosios notrelės	aerial parts	tea	menstrual disorders	1	
					women's diseases	2	
	Leonurus cardiaca L.; DZULT055	LT: sukatžolė; PL: pustyrnik, serdecznik	aerial parts	tea	for heart	1	1
					prophylactics	1	
					sedative	1	
			flowers	decoction	heart problems	1	
				tincture	for heart		2
	Melissa officinalis L.; DZULT014, DZULT131, DDZULT01	LT: melisa; PL: melisa	aerial parts	decoction, bath	sedative	1	
				tea	cold	1	
					for heart		1
					headache	1	
					sedative	4	2
			leaves	tea	helpful		1
					sedative	2	1
					sleep disturbance		1
	Mentha spp.; DDZULT11 (including *Mentha* × *piperita* L.; DZULT021; DZULT043, DZULT067, DZULT090; *Mentha spicata* L. DZULT046, DZULT068, DZULT085; DZULT087; DZULT113)	LT: senoviška smulkialapė mėta; mėta, mėtos, miata, senoviška/garbiniuotoji/ tikroji mėta; bulgariška mėta; pilkoji mėta; PL: mięta, mėta, miata	aerial parts	tea	bellyache	2	1
					diarrhoea	1	
					flatulence	1	
					for heart	1	
					for everything	1	
					headache	1	
					healthy	1	
					nausea	1	

Table 2 (continued)

Family	Latin name; voucher number	Local name(s)	Used part(s)	Preparation	Medicinal use	DUR	
						LT	PL
					organism cleansing	1	
					prophylactics	1	
					sedative	6	1
					sleep disturbance	1	
					toothache	1	
				whisked in the sauna	healthy	2	
			leaves	decoction	cough		1
					helpful		1
					sleep disturbance		1
					stomach ache		1
				tea	bellyache		1
					cold		2
					cough		1
					diarrhoea		1
					fever		1
					for everything		2
					healthy		1
					helpful		1
	Nepeta cataria L.; DZULT076	LT: citrininė katažolė	aerial parts	put in pillow	sleep disturbance in children	1	
				tea	sedative	1	
	Origanum vulgare L.; DZULT049, DDZULT09	LT: raudonėlis; PL: majrunas	aerial parts	tea	cold	1	
					cystitis		1
	Prunella vulgaris L.; DZULT006, DZULT040, DZULT042, DDZULT05, DDZULT42	PL: brunelka, harlanački, gorlanka	flowers	decoction	for everything		1
					sore throat		2
	Salvia officinalis L.; DZULT086, DZULT088, DZULT101	LT: senoviškas šalavijas; šalavijas	aerial parts	decoction, to rinse	sore throat	2	
					bleeding	1	
					tonsillitis	1	
				tea	appetiser	1	
					cold	2	
					headache	1	
					runny nose	1	
					sore throat	1	
					tonsillitis	1	
			stems	decoction, bath	diathesis in children	1	

Table 2 (continued)

Family	Latin name; voucher number	Local name(s)	Used part(s)	Preparation	Medicinal use	DUR	
						LT	PL
	Thymus pulegioides L.; DZULT007	LT: čibreliai	aerial parts	tea	cough	1	
					pneumonia	1	
	Thymus serpyllum L.; DZULT026	LT: čiobreliai, čiobrelis dekoratyvinis, čiobrelis pievinis, čiobrelis, čiombaras; PL: čiobreliai, czambor, čabrjec, čamborek, čambor, čamboryk, czamborek	aerial parts	decoction	cold		1
					healthy		1
				decoction, to rinse	sore throat		1
				tea	bronchitis		1
					cold	8	4
					cough	4	3
					for everything		2
					headache		1
					healthy		3
					helpful		1
					lung diseases		1
					organism cleansing	3	
					sedative	2	
					sore throat	1	
Linaceae	*Linum usitatissimum* L.	PL: linas, lon	seeds	decoction	diarrhoea		1
					duodenal ulcer		1
Lycopodiaceae	*Lycopodium clavatum* L.; DDZULT28, DZULT124, DDZULT28	LT: dziaraza, pataisai; PL: dzieraza	spores	topical application	burns		1
					contact dermatitis	1	
					diaper rash	11	1
					skin diseases		1
					wounds	2	
Malvaceae	*Malva neglecta* Wallr.	LT: [forgotten name]	aerial parts	alcohol maceration, topical application	limb pain	1	
	Tilia cordata Mill.; DZULT031, DDZULT10, DDZULT14	LT: liepa, liepžiedžiai (part used); PL: lipa, liepžiedžiai, lipovy ćviet (part used)	inflorescences	alcoholic infusion	healthy		1
				decoction	cold		4
					cough		2
					fever		1
				tea	cold	10	5
					cough	7	4
					fever	2	2

Table 2 (continued)

Family	Latin name; voucher number	Local name(s)	Used part(s)	Preparation	Medicinal use	DUR	
						LT	PL
					flu	1	
					for everything	1	
					healthy	2	1
					inflammation processes	1	1
					pneumonia	1	
				whisked in the sauna	healthy	1	
Menyanthaceae	*Menyanthes trifoliata* L.	LT: puplaiškis; PL: bobek	leaves	alcohol maceration	lung diseases	1	
				tea	lung diseases	1	
			whole plant with roots	decoction	poisoning		1
Oleaceae	*Fraxinus excelsior* L.; DZULT093	LT: uosis	bark	decoction, bath	allergy	1	
	Syringa vulgaris L.; DZULT023	PL: alyvos, bez	flowers	alcohol maceration, topical application	joint pain		1
					rheumatic pains		1
				alcoholic infusion	cough		1
					joint pain		1
Onagraceae	*Epilobium angustifolium* L.; DZULT074, DZULT082, DDZULT23, DDZULT24, DDZULT25, DDZULT35	LT: ivan chai; PL: kiprej, iwan-czaj	aerial parts	tea	healthy		1
			flowers	tea	prostate problems	1	
Orobanchaceae	*Euphrasia officinalis* L.	LT: akišvietė	aerial parts	decoction, bath	improve vision	1	
Paeoniaceae	*Paeonia* spp.; DZULT015, DZULT056, DDZULT32	LT: bijūnas, pivonija; PL: pievonija, pion, pivonai, piwonija, bijūnas, pion	flowers	boiled with milk	fright	2	
				decoction	fright		3
				decoction, bath	fright	2	
					sedative for children	1	
					sleep disturbance	1	
				fumigation	fright		2
				tea	evil eye		1
					fright	3	7
					heart problems	1	
					sedative	1	1
					sleep disturbance	2	
Papaveraceae	*Chelidonium majus* L.; DZULT035	LT: čistatiel, geltončius, karpažolė, ugniažolė, čistatiela, ugniažolė; PL: čystacieł, czystaciel, ugniażolė	aerial parts	decoction, bath	allergy	1	
					diaper rash	1	1
					diathesis in children	1	

Table 2 (continued)

Family	Latin name; voucher number	Local name(s)	Used part(s)	Preparation	Medicinal use	DUR	
						LT	PL
				tea	diaper rash	1	
					warts	1	
			latex	topical application	diaper rash	1	
					psoriasis	1	
					warts	12	6
					wounds	1	
	Papaver rhoeas L.	LT: aguona; PL: mak	seeds	cloth-wrapped infusion	sleep disturbance in children	1	
				decoction	sleep disturbance in children		1
				poppy milk	sedative for children	2	
Pinaceae	*Picea abies* (L.) H.Karst	LT: aglė, eglė; PL: jodła	cones	tea	lung diseases		1
			resin	ointment	abscesses	1	
					adhesion of bones	1	
					wounds	1	
				topical application	wounds		1
	Pinus sylvestris L.; DZULT051, DDZULT02, DDZULT15	LT: pušis, pušų kankorėžėliai (part used); PL: sasna, sosna, pušis	shoots with needles	decoction, bath	gout	1	
					radiculitis	1	
					rheumatic pains	1	
					allergy		1
				alcoholic infusion	cough		1
			cones	alcohol infusion	for everything	1	
					bronchitis		1
					cough		2
				decoction	bronchitis		1
			resin	ointment	burns		1
Plantaginaceae	*Plantago major* L.; DZULT004	LT: gyslotis, padarožnik; PL: babka, podoróżnik, babok, padarožnik	leaves	decoction	stomach ache		1
				tea	diarrhoea		1
					headache	1	
					stomach ache	2	
				topical application	abscesses	2	1
					bleeding	3	1
					cuts		1
					knee ache		1

Table 2 (continued)

Family	Latin name; voucher number	Local name(s)	Used part(s)	Preparation	Medicinal use	DUR	
						LT	PL
					wounds	1	3
	Veronica sp.; DDZULT33	LT: veronika	aerial parts	tea	fright	1	
Poaceae	*Avena sativa* L.	PL: avižos, owios	aerial parts	decoction, bath	allergy		1
					diathesis in children		1
	Elymus repens (L.) Gould	LT: varputis	aerial parts	decoction	sore throat	1	
				tea	kidney stones	1	
					organism cleansing	1	
	Hordeum vulgare L.	PL: jačmień	seeds	decoction, bath	diathesis in children		1
	Secale cereale L.	PL: rož, żyta	aerial parts	decoction	helpful		1
			seeds	topical application	erysipelas		1
	Triticum aestivum L.	PL: ruń	aerial parts	decoction, bath	diathesis in children		1
Polemoniaceae	*Polemonium caeruleum* L.	PL: rabinka	aerial parts	tea	diarrhoea		2
					dysentery		1
Polygonaceae	*Fagopyrum esculentum* Moench; DZULT130	LT: grikiai; PL: hrečka	flowers	decoction	for memory		1
			seeds	decoction, bath	diaper rash	1	
	Polygonum aviculare L.; DZULT044, DZULT123	LT: takažolė; PL: pciczy gorec	aerial parts	tea	inflammation processes	1	
					men's diseases		1
					urine problems	1	
				topical application	bleeding	2	
	Reynoutria japonica Houtt.; DZULT096	LT: rasvėratrolis	flowers	tea	antioxidant	1	
					flu	1	
			twigs with leaves	whisked in the sauna	flu	1	
					healthy	1	
Primulaceae	*Primula veris* L.	LT: rakteliai	flowers	tea	bronchitis	1	
					cold	1	
					flu	1	
					pneumonia	1	
Rhamnaceae	*Frangula alnus* Mill.	PL: kruszyna	bark	decoction	diarrhoea		1
Rosaceae	*Alchemilla vulgaris* L.	LT: rasakila, rsakila	aerial parts	decoction, bath	skin diseases	1	
				tea	organism cleansing	1	
					women's diseases	1	
	Argentina anserina (L.) Rydb.; DZULT072	LT: sidabražolė pievinė	leaves	decoction	diarrhoea	1	
	Aronia melanocarpa (Michx.) Elliott	PL: čornaja rjabina	fruits	compress	diathesis in children		1
				decoction, bath	diathesis in children		1

Table 2 (continued)

Family	Latin name; voucher number	Local name(s)	Used part(s)	Preparation	Medicinal use	DUR	
						LT	PL
	Crataegus spp.; DZULT095	LT: gudobelė, gudabelė; PL: gluk, bajarysznik	flowers	eaten fresh	for heart	1	
				tincture	for heart		1
			fruits	eaten fresh	for heart	1	
				tincture	for heart		1
	Filipendula ulmaria (L.) Maxim.; DZULT128, DDZULT41	LT: aspirinas, vingiorykštė, ingražolė	flowers	tea	analgetic	1	
					cough	1	
					diaphoretic	1	
					fever	1	
					inflammation processes	1	
	Fragaria vesca L.; DZULT025, DZULT037	LT: žemuogė, žemuogės; PL: poziomki, żemuogės	aerial parts	tea	cold		1
					cough		1
					for heart	1	
					for everything	1	
					headache	1	
					heart problems		1
			fruits	tea	antibiotic		1
					fever		1
					vitamin source	1	
			leaves	tea	antibiotic		1
					headache	1	
					healthy	1	
					kidney diseases	1	
	Fragaria viridis Weston	PL: kłubnika	calux	decoction	cold		1
	Malus sylvestris (L.) Mill.	LT: laukinė obelis	flowers	tea	cough	1	
					fever	1	
	Potentilla erecta (L.) Raeusch.; DZULT072	LT: sidabražolė miškinė, sidabražolė	aerial parts	tea	diarrhoea	1	
			roots	tea	diarrhoea	2	
	Prunus cerasus L.	PL: višnia	fruits	alcoholic infusion	hypertension		1
				tea	for everything		1
	Prunus padus L.; DZULT122	PL: Ieva, czaromucha	flowers	alcohol maceration, topical application	joint pain		1
					rheumatic pains		1
				tea	joint pain		1
	Prunus domestica L.	LT: sliva	fruits	eaten fresh	constipation	1	

Table 2 (continued)

Family	Latin name; voucher number	Local name(s)	Used part(s)	Preparation	Medicinal use	DUR	
						LT	PL
	Pyrus pyraster (L.) Burgsd	LT: laukinė kriaušė	flowers	tea	cough	1	
					fever	1	
	Rosa spp.	PL: szypownik	fruits	tea	cold		1
					cough		1
					for everything		1
					helpful		1
			leaves	tea	for everything		1
	Rubus idaeus L.; DZULT028, DDZULT36, DZULT107	LT: avietė, avietės, malina; PL: avietės, malina, malińniak, malińnik, maliny	stems (with leaves)	decoction	cold	4	15
					fever		1
					pneumonia	1	
					cough	2	1
					breathlessness		1
				inhalations	cold	1	
					inflammation processes	1	
				tea	bronchitis	1	
					cold	6	6
					cough	3	3
					inflammation processes	1	
					flu		1
					sore throat		1
				whisked in the sauna	healthy	1	
			fruits	alcoholic infusion	cold		2
					flu		1
				eaten fresh	healthy		1
				jam	cold	3	4
				juice	cold		1
					helpful		1
				raw jam	cold		3
					flu		1
				tea	cold	5	1
					cough	3	
					flu	1	1
					healthy	1	
					sore throat	1	

Table 2 (continued)

Family	Latin name; voucher number	Local name(s)	Used part(s)	Preparation	Medicinal use	DUR	
						LT	PL
			leaves	tea	cold	3	1
					fever		1
					flu		1
	Sorbus aucuparia L.; DZULT009	LT: šermukšnis; PL: rabina, rjabina, šermukšnis	flowers	tea	diuretic		1
					fever	1	
					sweating		1
			fruits	alcoholic infusion	flu	1	
					healthy	1	
					vitamin source	1	
				eaten fresh	vitamin source	1	
				eaten frozen, mixed with honey	flu	1	
					for heart		1
					healthy	1	
					vitamin C	1	
				jam	healthy		1
				oil infusion	healthy	1	
				syrup	healthy	1	
				tea	for heart		1
					for everything		1
Rutaceae	*Ruta graveolens* L.	LT: rūta	aerial parts	tea	for heart	1	
Salicaceae	*Populus tremula* L.; DZULT136	LT: topolis; PL: topal, topol, topolis	buds	alcohol maceration, topical application	bleeding	1	
					pityriasis rosea		1
					wounds	1	2
				alcoholic infusion	cuts		1
					gastric ulcer	1	1
					jaundice	1	
					joint pain		3
					liver diseases	1	
					rheumatic pains		1
					wounds	1	1
				decoction	diarrhoea		1
			leaves	topical application	antiseptic		1
	Salix spp.; DZULT008, DZULT011, DZULT061, DZULT133	LT: karklas, žilvitis, verba; PL: wierzba	catkins	eaten fresh	liquefies blood	1	

Table 2 (continued)

Family	Latin name; voucher number	Local name(s)	Used part(s)	Preparation	Medicinal use	DUR	
						LT	PL
				fumigation	headache	1	
				tea	headache	1	
					liquefies blood	1	
			twigs	fumigation	evil eye	2	
					fright		1
Sapindaceae	*Acer platanoides* L.; DZULT029, DZULT062	LT: klianas, klevas	twigs with leaves	whisked in the sauna	healthy	1	
	Aesculus hippocastanum L.; DZULT034, DZULT057	PL: kaštan, kaštonas, kasztan	flowers	alcohol maceration, topical application	varicose veins		2
				alcoholic infusion	joint pain		4
					toothache		1
			fruits	alcohol maceration, topical application	varicose veins		2
				alcoholic infusion	joint pain		5
				compress	joint pain		1
Scrophulariaceae	*Verbascum nigrum* L., DZULT117	LT: daugiažiedė, šimtažiedė	flowers	tea	sore throat	1	
Solanaceae	*Datura stramonium* L.; DZULT069, DZULT098, DZULT135	LT: durnadagis, durnapjanas, durnaropė, durnoj ropė; PL: durnaropė, durnapjanas	aerial parts	alcohol maceration, topical application	external pain	1	
				fumigation	fright	2	
			leaves	fumigation	fright	3	
				tea	sedative	1	
			roots	eaten fresh	sedative	1	
				tea	fright	1	
					sedative	1	
			seeds	fumigation	fright	1	1
				tea	fright		1
					sedative		1
	Solanum tuberosum L.; DZULT032	LT: bulvė; PL: bulba, kartofle, kartoška	tubers	compress	abscesses		1
					eye inflammation	1	
					sore throat		1
				inhalations	cold	2	
					cough		1
					sore throat		2
				juice	gastric ulcer	1	
					heart rate	1	

Table 2 (continued)

Family	Latin name; voucher number	Local name(s)	Used part(s)	Preparation	Medicinal use	DUR	
						LT	PL
Theaceae	*Camellia sinensis* (L.) Kuntze	LT: juoda arbata	leaves	compress	eye inflammation	1	
Thymelaeaceae	*Daphne mezereum* L.	LT: vilkauogė, vilkauogis	aerial parts	topical application	toothache	1	
Urticaceae	*Urtica dioica* L.; DZULT002, DZULT017	LT: dilgėlė, dilgėlės, dilginės; PL: krapiwa, pokrzywa	aerial parts	decoction, bath	hair care	1	
				tea	acne	1	
					blood coagulation	1	
					improve blood quality	1	
					organism cleansing	1	
					stomach ache		1
				topical application	joint pain		1
				whisked in the sauna	healthy	1	
			leaves	decoction	healthy		1
				tea	blood vessels	1	
					cough		1
					varicose veins	1	
			aerial parts in spring	decoction, bath	vitamin source	1	
				eaten cooked	healthy	1	
				eaten fresh	vitamin source	1	
	Urtica urens L.; DZULT053	PL: żyčka	aerial parts	decoction	healthy	1	
				topical application	wounds		1
Viburnaceae	*Sambucus nigra* L.; DZULT081	LT: juodasis šeivamedis	fruits	syrup with honey	tonic	1	
	Viburnum opulus L.; DZULT010	LT: kalina, putinas; PL: kalina, putinas	flowers	tea	diuretic		1
					heart rate		1
					sweating		1
			fruits	alcoholic infusion	heart problems		1
					hypertension		1
				decoction	hypertension		1
				eaten fresh	healthy		1
					hypertension	4	2
				juice	hypertension	3	
					intestinal pain	2	
				raw jam	diabetes	1	
					for heart	1	

Table 2 (continued)

Family	Latin name; voucher number	Local name(s)	Used part(s)	Preparation	Medicinal use	DUR	
						LT	PL
					hypertension	6	1
				syrup	hypertension		1
					varicose veins		1
				tea	healthy	1	
					hypertension	1	1
					vitamin source	1	
Violaceae	*Viola tricolor* L.	LT: laukiniai broliukai, širdininkai	aerial parts	decoction, bath	diaper rash	1	
				tea	cancer	1	
					diaper rash	1	
					for heart	1	
					for everything	1	

taxa cited, as it was essentially the same across different schooling levels (Spearman's $\rho = -0.018$, $p = 0.885$).

Marked differences appeared between LT and PL in several medicinal categories, especially digestive and general/unspecified. LT reported more taxa for general/unspecified uses (55 vs 44) and more digestive remedies (30 vs 24). By contrast, musculoskeletal, neurological, urological, and cardiovascular conditions showed similar proportions in both groups. As shown in Fig. 4 (lighter yellow-green shades), etic categories such as ear, eye, and reproductive health (including pregnancy, childbirth, and family planning) contained the fewest taxa. The greater diversity of plants used for general health in LT suggests a broader application of herbal medicine, whereas PL displayed a more balanced spread across categories.

In total, 135 emic categories of medicinal use were documented (PL: 87; LT: 115), while 27 categories that were reported historically are no longer in use. Many of them referred to illnesses remembered by older generations, such as smallpox, diphtheria, scrofula (*"gland disease"*), jaundice, dysentery, rickets, and worm infections, among others. During the second half of the twentieth century, vaccination and public health measures led to the decline or near disappearance of specific disease categories. As certain diseases faded from everyday discourse, the plant remedies once used to treat them also declined in local practice. Some ailments, including rheumatism, arthritis, hypertension, anaemia, or diabetes, among others, remained relevant but were reframed over time. In the case of anaemia, traditionally it was described as "*weak blood*", whereas nowadays it is mostly framed by the biomedical definitions circulated in clinics and health literature.

Knowledge hybridisation patterns

Although the dataset is firmly grounded in LEK (A), the most frequent hybrid knowledge combinations were AC (local + popular, n = 64), BC (formal + popular, n = 52), and ABC (local + formal + popular, n = 31) (Fig. 5a). In contrast, formal-only uses occurred in 38 cases and popular-only in 24. The LT group engaged far more with hybridised knowledge, citing 56 cases compared to 22 in the PL group (Fig. 5b). In PL, ABC-type hybridisation was very low, occurring in only two species (*Vaccinium myrtillus* and *Aloe* spp.), whereas in LT, 29 plant species were fully hybridised. This pattern reinforces earlier findings that PL knowledge and practices are less epistemically hybridised. By contrast, 29 fully hybridised species were recorded in the LT community, indicating greater institutional embedding and more active interactions with both the formal and popular knowledge systems.

Some taxa, such as *Hippophae rhamnoides*, displayed diverging trajectories in terms of knowledge hybridisation. It was fully hybridised in the LT community, but it

Fig. 2 Cross-ethnic comparison. **a**) Jaccard index with a proportional Venn diagram for all the medicinal plant taxa reported among the LT and PL communities; illustrative photograph of *Brassica oleracea* in use; **b**) the Jaccard index and a proportional Venn diagram of medicinal taxa mentioned by at least three interviewees, illustrative photograph of *Aloe* spp. in a domestic setting. Photo credits: JP, 2018–2019

Fig. 3 Medicinal uses of wild plants documented during fieldwork, illustrating different use categories and preparation states: **a**) freshly foraged leaves of *Tussilago farfara* (LT); **b**) demonstration of the medicinal use of *Chelidonium majus* (PL); **c**) powdered spores of *Lycopodium clavatum* (LT); **d**) dried buds of *Pinus sylvestris* (PL); **e**) dried aerial parts of *Matricaria chamomilla* (LT); **f)** foraging of *Achillea millefolium* (LT); **g**) dried aerial parts of *Rhododendron tomentosum* (LT); **h**) dried inflorescences of *Helichrysum arenarium* (PL); **i**) dried aerial parts of *Gymnocarpium dryopteris* (PL). Photo credits: JP, 2018–2019

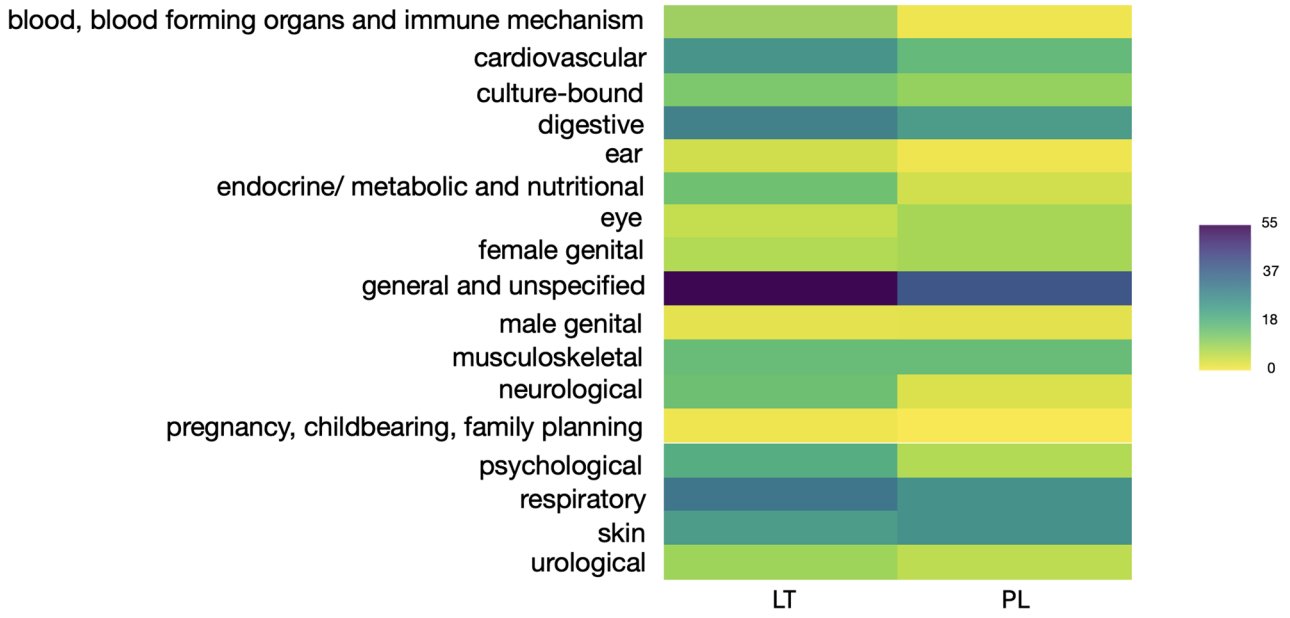

Fig. 4 Comparison of medicinal plant use across ICPC-2 categories among LT and PL ethnic groups. The colour scale ranges from yellow (low values) to dark purple (high values), indicating the relative number of plant taxa used in each category

was not included in the hybrid categories for PL. By contrast, *Acorus calamus* remained non-hybrid, restricted specifically to LEK. Additionally, for *Cucumis sativus, Daucus carota*, or *Euphrasia officinalis*, for example, LT interviewees reported hybridised uses drawing on multiple knowledge sources, while PL interviewees reported only single-source uses.

The results point out contrasts between LT and PL in terms of how knowledge is hybridised and the range of sources drawn upon for medicinal plant uses. The Shannon–Wiener diversity index (*H'*) was 0.97 for LT and 0.52 for PL, indicating greater epistemic diversity among LT interviewees. Moreover, when considering the degree of hybridisation across general knowledge origins domains, the LT community showed a markedly higher degree of hybridisation (HD = 0.195) compared to PL (HD = 0.059). We found a statistically significant difference in the degree of hybridisation between the LT and PL groups, indicating that the knowledge systems differ meaningfully (Student's $t = 3.450$, $p = 0.002$, $n = 67$). This suggests that, despite a shared plant repertoire, patterns of knowledge integration differed. PL showed more internal hybridisation (0.266) than LT (0.106).

A closer look at the plant level reveals more nuanced differences between LT and PL communities. As shown in Fig. 6, among the LT, several culturally and medicinally versatile species (including *Cucumis sativus, Daucus carota, Equisetum arvense, Euphrasia officinalis, Hippophae rhamnoides, Malva neglecta, Mentha × piperita, Primula veris*, and *Stellaria media*) attained full hybridisation (HD = 1). This suggests that knowledge about these plants is maintained simultaneously through local practice, scientific reference, and popular culture. By contrast, only two taxa, *Polygonum aviculare* and *Silene vulgaris,* achieved this score in the PL sample, reflecting a narrower set of plants for which knowledge circulates across all three epistemic spheres.

More specifically, when subcategories are considered, the dominant bases are A1 (intergenerational; 533 DUR) and A4 (ancestral; 223). Notable internal A-combinations include A1 + A3 (intergenerational + oblique; 89), A2 (horizontal local transfer; 64), and A1 + A4 (intergenerational + ancestral; 53). Among cross-source hybrids, the most common are B1 + C1 (formal publications + popular media; 32), A1 + B1 (intergenerational + formal publications; 22), A1 + C1 (intergenerational + newspapers/magazines; 20), and A1 + B1 + C1 (intergenerational + formal publications + newspapers/magazines; 20). However, this pattern differs between groups. PL relied comparatively more on combinations linked to formal and professional channels, especially B1 + B2 (formal publications + health professionals; 10) and A3 + B2 (oblique + health professionals; 9). Their profile is thus dominated by local and community-based continuity, with cross-source hybrids occurring only rarely. By contrast, LT demonstrated broader hybridisation, including a higher share of fully integrated ABC cases (LT = 29 vs. PL = 2). LT knowledge patterns also reveal multiple cross-source combinations, for instance, B1 + C1 (formal publications + newspapers/magazines; 24), A1 + B1 (intergenerational + formal publications; 22), A1 + C1 (intergenerational + newspapers/magazines; 17), A1 + B1 + C1 (intergenerational + formal publications + newspapers/magazines; 19), and B1 + B4 + C1 + C3 (formal publications + digital medical

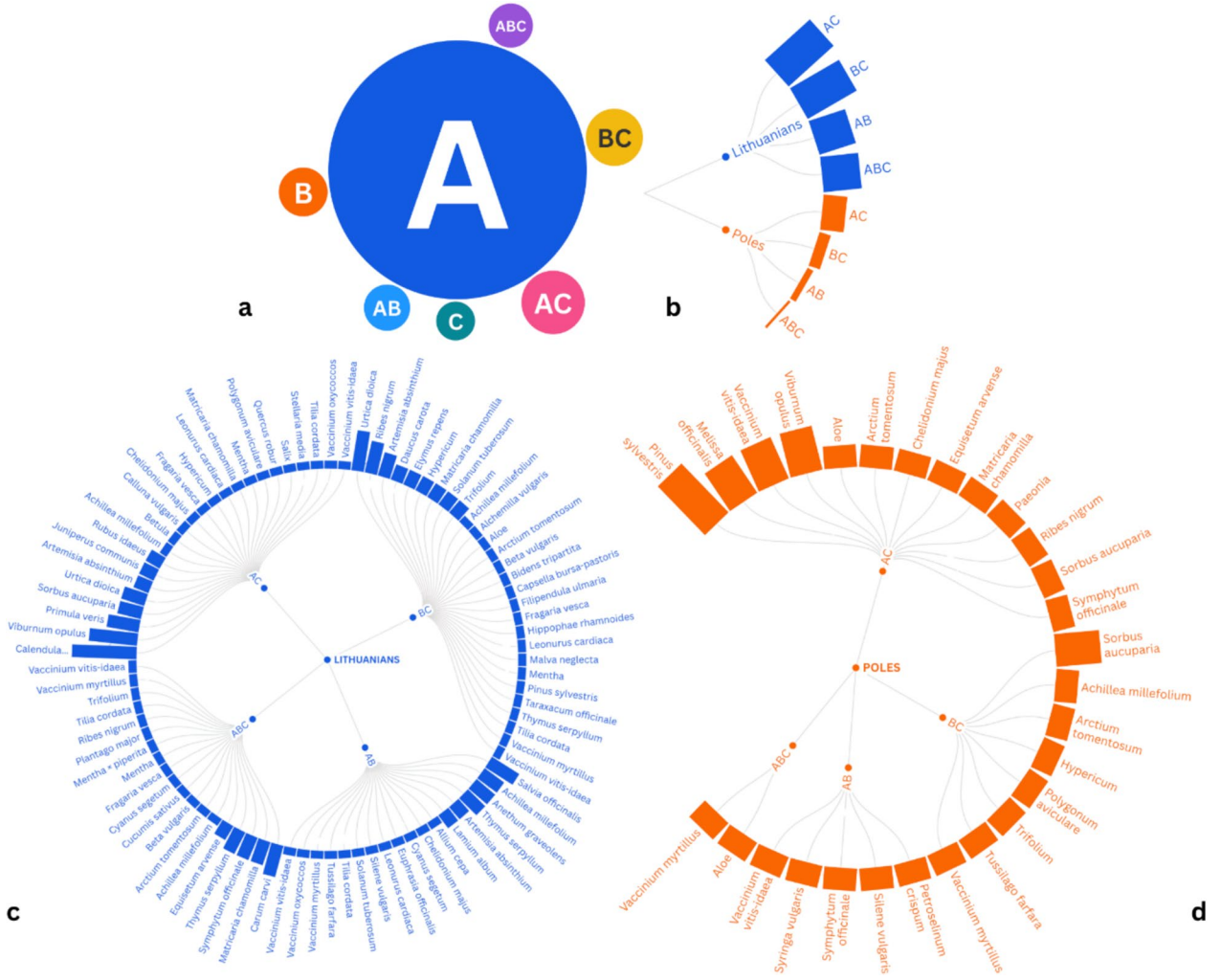

Fig. 5 Distribution of medicinal plant taxa across knowledge origin categories: **a**) Relative frequency of categories in the whole dataset (A – local, B – formal, C – popular, AB – local and formal, AC – local and popular, ABC – local, formal, and popular); **b**) Comparison of category proportions between Lithuanian (blue) and Polish (orange) interviewees; **c**) Taxa associated with different knowledge categories among Lithuanians; **d)** Taxa associated with different knowledge categories among Poles

resources + newspapers/magazines + social media and popular websites; 15), as shown in Fig. 7.

Patterns of hybridisation differed across the emic categories of medicinal plant use, including both disease-related and preventive/functional domains. High knowledge diversity and integration were observed in vitamin supplementation ($H' = 0.64$, HD = 1.00), body cleansing ($H' = 1.08$, HD = 0.75), bone adhesion ($H' = 1.05$, HD = 0.60), blood quality improvement ($H' = 1.33$, HD = 0.50), and urinary bladder diseases ($H' = 1.03$, HD = 0.50). In contrast, there was little recorded variety and almost no hybridisation in abscesses, diarrhoea, culture-bound syndromes (such as fright or the evil eye), and eye conditions.

Interviewees who mentioned a greater number of plant taxa tended to show higher levels of knowledge hybridisation, as confirmed by a significant Spearman correlation ($\rho = 0.652$, $p < 0.001$). Specifically, LT participants cited more taxa (mean ± SD = 28 ± 21.6) than PL (16.38 ± 15.9). The difference was statistically significant (Student's $t = 2.455$, $p = 0.017$, $n = 67$). Robustness was confirmed with a Wilcoxon rank-sum test ($p < 0.05$). This suggests that both the diversity and hybridity of plant knowledge studied in the borderland area are more pronounced in the LT group.

Sociodemographic correlates of medicinal plant knowledge hybridisation

A significant negative correlation was observed between hybridisation and the age of interviewees (Spearman's $\rho = -0.38$, $p = 0.001$), indicating that younger interviewees tend to have higher degrees of hybridisation in medicinal use. In contrast, gender showed no significant association with hybridisation (Spearman's $\rho = -0.17$, $p = 0.185$).

Fig. 6 Cross-ethnic comparison of hybridisation patterns in medicinal plant taxa between the Lithuanian (blue) and Polish (orange) communities. HD (Degree of Hybridisation) quantifies the proportion of use reports combining multiple knowledge sources and ranges from 0 (all use reports derived from single knowledge origin) to 1 (all use reports classified as hybrid)

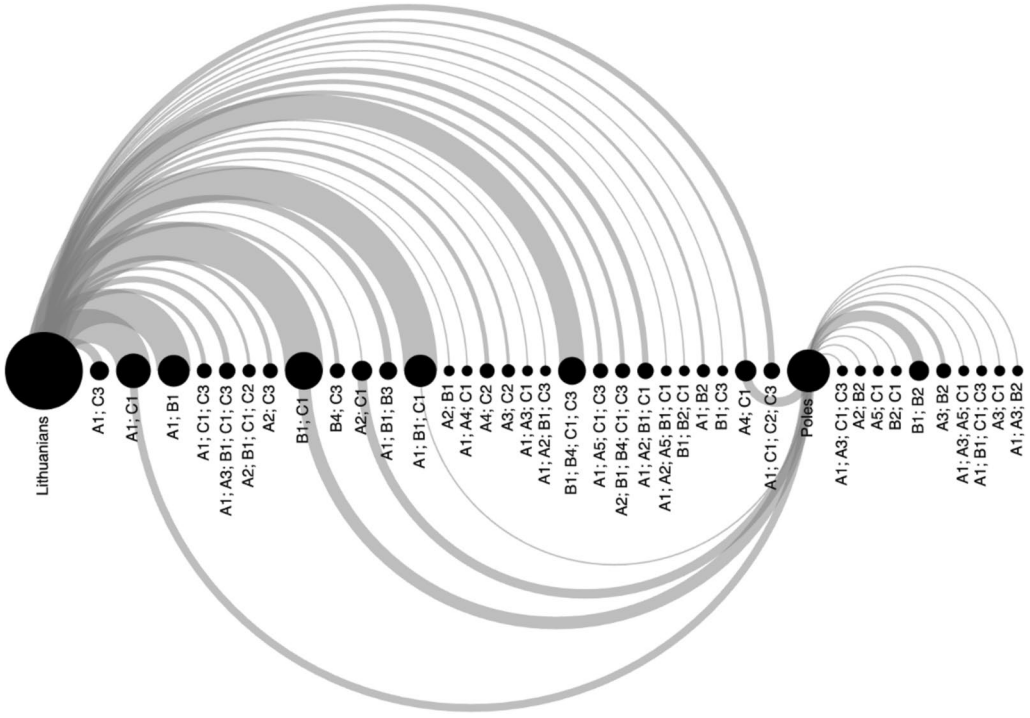

Fig. 7 Cross-source hybridisation patterns of medicinal plant knowledge among Lithuanians and Poles. The size of the nodes corresponds to the relative importance of knowledge combinations of subcategories, while the thickness of the connecting lines is proportional to the number of detailed use reports (DUR)

Similarly, although a higher educational level was weakly associated with increased hybridisation (Spearman's $\rho = 0.23$, $p = 0.199$), this relationship was not statistically significant.

Although the correlation between the number of spoken languages and the degree of knowledge hybridisation was weak (Spearman's $\rho = 0.23$), it did not reach statistical significance ($p = 0.060$). Still, the direction of the association suggests a potential trend worth exploring. This indicates that multilingual individuals may be more likely to access and integrate diverse knowledge domains, although this trend does not reach formal significance in our sample.

Discussion

Our sample generally shows low levels of hybridisation, suggesting that the LT and PL communities along the Belarusian border continue to rely primarily on their local ecological traditions. Nearly 40% of the reported plant-based remedies came from A1-type (intergenerational) sources. In practice, this meant that people most often learnt about plants from their parents or grandparents, underscoring the vital role of kinship in the transmission and translation of ethnomedicinal knowledge. Earlier studies have shown that vertical transmission is key to preserving continuity in plant use [40, 47]. At the borderland site, our interviewees reported that knowledge of medicinal plants continues to circulate within families and village networks during everyday conversations. One reason for this persistence lies in the social dynamics of learning. Bond & Gaoue [6] found that prestige and homophily significantly predict the structure of social learning networks related to medicinal plant knowledge. That is, individuals tend to learn from those they perceive as similar (e.g., individuals of the same age, gender, or social background) or prestigious, for example, respected elders or educated individuals.

In both the LT and PL groups, ancestral/historical transmission (A4) ranked second among the origins of knowledge. Many described their plant lore as self-evident: "*what has always been there*", handed down from one generation to the next. Earlier studies on the medicinal use of fungi in the region reached similar conclusions, demonstrating that people view such knowledge as a continuous tradition over time [57]. Such findings point to a dominance of relational worldview: knowledge is not seen as something new but as something carried forward, sustained through trust in local community traditions.

Even with greater hybridisation, grandparents, neighbours, and elders remained important teachers, demonstrating the enduring strength of oblique transmissions. Such practices reveal the resilience of local knowledge systems and their capacity to coexist with, or resist, global knowledge systems, echoing observations by Vandebroek and Balick [72]. Horizontal (A2) and oblique forms of learning (A3), which involve multiple transmitters and

Fig. 8 Interview with Lithuanian herbalist, Elena Targavičiene: her traditional homestead surrounded by a flower garden (top left); framed certificates and photographs testifying to her public recognition (middle left), including an official state award; devotional images and bunches of dried herbs hanging in her home (middle left, lower); and dried mixtures of medicinal plants stored in large quantities (bottom left). Photo credits: JP, 2018

non-parental figures, help maintain coherence within communities while also facilitating adaptation and cultural change [60]. From this perspective, hybridisation can be seen less as a rupture than as a reframing process, since continuity itself provides the basis for renewal and invention.

In the LT case, by contrast, herbal specialists (A3) appear more strongly as mediators of cross-source knowledge, complementing the broader set of hybrids based on A1 (intergenerational). The role of herbal specialists was exemplified by Elena Targavičienė (Fig. 8), a widely respected herbalist in the examined area. We had the possibility to interview her not long before she passed away. When we returned the following year, her daughter welcomed us and continued the conversation, clarifying several moments on plant use. This sequence illustrates the moment of generational transition: while Targavičienė embodied oblique transmission as a community expert, her daughter represents vertical transmission, preserving memory and ethnobotanical practices. Taken together, these encounters demonstrate that the specialist's authority did not end with her life but persisted in her daughters' memories and within local community, which continues to recall her as a leading expert in plant knowledge with high-level expertise dating back to pre-WWII times. These findings highlight the continuing importance of oblique transmission, where (local) expertise outside the family line actively reshapes modern plant knowledge [37].

Popular knowledge (C) was rarely mentioned as an independent source, whether in the form of herb columns in newspapers, calendars or advice shared on social media. Interviewees often tied popular sources to what they already knew from family or formal channels: *"We saw it in the calendar, but we already did this at home"* (Polish, female, 45 years old), or *"Facebook only repeats what my grandmother used to say"* (Lithuanian, female, 52 years old). Badke et al. [3] observed a similar pattern: plants that have already received formal validation typically receive the most discussion in local newspapers and magazines. A comparable process was observed in the re-narrativisation of *Epilobium angustifolium* in Eastern Europe, where media outlets, newspapers, magazines, and later online platforms amplified rather than originated medicinal narratives [53]. In that case, traditional motifs were blended with selectively cited scientific findings, and their active circulation through social media helped shape the plant's modern valuation.

In our dataset, formal knowledge (B) was comparatively marginal and rarely cited as a single source. When it first appeared, it was frequently combined with LEK (e.g., A1 + B1 intergenerational + formal publications), suggesting that integration occurs primarily through informal, practice-based hybridisation rather than the formal replacement or displacement of community knowledge. These patterns align with Tengö et al.'s [68] multiple-evidence-based approach, which emphasises dialogic involvement as a step towards co-production rather than hierarchy across knowledge systems.

Participants in our interviews sometimes expressed a need to discover scientific confirmation for the LEK they possess, vigorously combing the knowledge from academic publications to verify or support long-standing community practices. This behaviour pattern exemplifies

bottom-up epistemic negotiation, where local knowledge holders seek convergence with academic science, not out of deference but in acknowledgement of its legitimate function [29]. Our findings echo Ziman & Ziman's [79] observation: people often mentioned a doctor's advice, a pharmacy leaflet, or a medicinal book not as something new, but as confirmation of remedies they already used and trusted. Our data extend the argument made by Frazão-Moreira et al. [18] that written texts are themselves a vehicle of LEK. This highlights the inherently hybrid nature of contemporary ethnobotanical knowledge systems.

Health professionals (B2) (doctors, nurses, and local pharmacists) were often described as reliable sources of knowledge about medicinal plants. Yet their authority was not presented as purely formal; it was embedded in relationships and everyday practice. Several people explained that they first heard a recommendation from a doctor or pharmacist and then added, with a kind of reassurance, that the same remedy was "*also known in our village*" or "*something we have always done*". This layering creates what we might call reverse legitimisation: biomedical voices end up validating long-standing community knowledge rather than replacing it [77]. Biomedical authority is selectively incorporated more into local knowledge of the PL community. In the PL case, combinations such as B1 + B2 (formal publications + health professionals) and A3 + B2 (oblique + health professionals) indicate that biomedical practitioners and non-kin experts remain important transmitters, even if overall hybridisation is less pronounced. Instead of challenging LEK, health professionals seemed to reinforce it, offering a subtle endorsement that allowed hybrid systems to remain continuous while also adapting.

We found that hybridisation is a selective process, primarily occurring in relation to plant species with disputed or complex medicinal applications, rather than representing a universal trait of medicinal plant knowledge. Accordingly, hybridity should not be viewed as inherently positive or negative; rather, its effects are context-dependent: while local knowledge can be displaced and marginalised through formal and popular knowledge in processes of "epistemic homogenisation" [49], our findings also show how local knowledge can become legitimised and potentially safeguarded through processes of hybridisation.

The highest levels of hybridisation were found in areas such as blood coagulation, diabetes, and anaemia, as well as in the few cancer-related uses reported, where biomedical and local explanatory models sometimes converged. Emic categories, such as vitamin supplementation and detoxification, are relatively new health narratives that have been widely disseminated by formal and popular sources [43] and are becoming increasingly integrated into LEK through formal health channels and media exposure. By contrast, conditions rooted in culture, such as fear, the evil eye, or weightlifting injuries, were addressed almost exclusively within the LEK domain, with only rare points of contact with other systems. Interviewees sometimes combined traditional and biomedical framing within the same person's repertoire. In one interview, a 44-year-old Lithuanian woman described *Artemisia vulgaris* as a plant that "*warms the belly*", while also noting that it "*supports the gastrointestinal system through antispasmodic effects*".

Pieroni et al. [51] reported that during the COVID-19 pandemic in the Vilnius region, media narratives and biomedical discourse amplified the traditional use of medicinal plants for immune support, respiratory health, and overall well-being. In such critical moments, popular and academic perspectives did not displace LEK. Instead, they reframed and reinforced it, creating new domains for hybrid health practices.

Our analysis revealed a positive association between the number of medicinal plant taxa reported by interviewees and the degree of knowledge hybridisation. Interviewees with broader botanical repertoires are more likely to expand, support or update their knowledges through new inputs. This co-occurrence reflects a form of resilience through diversification frameworks [15]. In parallel to ecosystems where multiple species contribute to the same function with varying responses to disturbance, our data suggest that individuals drawing on diverse medicinal plant taxa and multiple knowledge sources embody a biocultural form of response diversity: diversified knowledge portfolios may support adaptive capacity under change. On the plant level, the likelihood of knowledge hybridisation appears to be linked to both the therapeutic domain and the circulation of knowledge. Taxa associated with biomedical discourse and supplementation (e.g., *Symphytum officinale, Thymus serpyllum*, *Matricaria chamomilla*) were frequently hybridised, while plants tied to culturally specific or marginal uses (e.g., *Acorus calamus, Tilia cordata*) remained within LEK. Widely cultivated or commonly encountered in daily life, these plants (e.g., *Cucumis sativus*, *Daucus carota*, or *Aloe* spp.) tend to attract knowledge through multiple channels, reflecting their everyday accessibility. These patterns underscore how therapeutic relevance, visibility, and institutional embedding influence the degree of hybridisation among groups.

According to our findings, age also significantly influences the degree of hybridisation, even though earlier ethnobotanical research has demonstrated that elders have a more comprehensive and varied understanding of medicinal plants and rely on traditional health care more often than younger people [4, 65]. Younger interviewees demonstrated greater levels of integration with digital

media discourses, whereas older interviewees generally retained medicinal plant knowledge based on historical and intergenerational transmission. Our results also support previous findings that the increasing influence of digital media on how people perceive and use herbal remedies is evident nowadays [1]. This suggests that age predicts both relative epistemic flexibility and receptiveness to hybrid knowledge forms, as well as the depth of knowledge within LEK.

Multilingual participants from both ethnic groups explained that they rely on formal and popular sources available in the different languages they use. Monolingual speakers, by contrast, tended to pass remedies only within their families. This difference is particularly noticeable in the borderlands, where plant names, recipes, and advice circulate in several languages simultaneously [2]. In such environments, language serves as more than just a means of communication, it can either unlock or block access to knowledge [14]. In our case, local knowledge has historically circulated in overlapping Lithuanian, Polish, Belarusian, and Russian registers, giving multilinguals a broader repertoire of sources. Earlier work has shown that when people use more than one language, they are forming their ethnobotanical practices from different traditions. It, in turn, enriches the diversity of plants they keep in use within their local communities [34].

These patterns suggest that hybridisation operates not merely as a measure of *what is known* but as a reflection of how individuals are situated to access, interpret, and integrate diverse epistemic traditions. While minimal hybridisation implies the strength of intergenerational transmission and the integrity of locally rooted knowledge systems, higher degrees of hybridisation suggest adaptability, openness, and epistemic flexibility within the community.

Combining knowledge too quickly or without a foundation in lived practice puts it at risk of losing coherence and reliability. It also comes with a risk of marginalising local knowledge, especially in the younger generation who are increasingly immersed in a rapidly digitalising world. Yet when hybridisation grows out of dialogue and everyday practice, it can add diversity without erasing what makes local traditions specific. From this perspective, knowledge hybridisation is not an event with uniform effects on local knowledge but rather a process shaped in diverse ways by culture, community values, and broader socio-ecological conditions.

Conclusions

Our results underline the need for sociocultural positioning and historical exposure to institutional frameworks, such as the language of education and written sources, in shaping the content and diversity of hybrid knowledge systems within culturally adjacent yet separate communities. Taken together, our findings show that the consequences of knowledge hybridisation are ambivalent and context-dependent, requiring conscious, situated approaches rather than generic promotion.

The study highlights that, especially in light of environmental and sociopolitical changes, hybridity in LEK cannot be understood as intrinsically beneficial or detrimental. Rather, its effects are contextually shaped: on the one hand, formal and popular knowledge can displace local knowledge, marginalising or eroding community practices; on the other hand, they may also safeguard or revitalise it, for instance, when local knowledge is legitimised through formal science or amplified through digital media. Conscious approaches to hybridity, therefore, require attentiveness to both opportunities (e.g., safeguarding or revitalising local knowledge) and risks (e.g., displacement, marginalisation, or the erosion of autonomy).

Our findings suggest that hybrid systems draw on a wider range of plant knowledge sources and medicinal uses, lending credence to the view that knowledge hybridity might be favourably linked with ethnobotanical diversity. Hybridisation, therefore, appears as both a cultural and cognitive tool that enables people to expand and modify their foundational knowledge of medicinal plants.

From the perspective of its origins, contemporary medicinal plant knowledge emerges as fluid, continually reshaping what is learnt at home, transmitted through formal channels, and circulated via popular media. It is not a static inheritance but a living practice, dynamically maintained through continual acts of integration and adaptation. We foresee that a more comprehensive understanding of the dynamics and complexity of hybrid knowledge systems will support the creation of inclusive, flexible, and resilient biocultural frameworks for conservation and transformative change.

Abbreviations

LT	Lithuanians
PL	Poles
LEK	Local Ecological Knowledge
DUR	Detailed Use Report
ICPC-2	International Classification of Primary Care
WWII	Second World War
COVID-19	Coronavirus Disease 2019
HD	Degree of Hybridisation

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Author contributions
J.P. and R.S. conceived and designed the research. J.P. and P.Š. collected the data, including conducting interviews and collecting voucher specimens. J.P., L.C., D.L., and R.S. contributed materials/analysis tools. J.P. drafted the manuscript. All authors contributed to the writing and gave final approval for publication.

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Data availability
Data are available upon request from the corresponding authors.

Declarations

Ethics approval and consent to participate
Ethical approval was granted by the Ca' Foscari University of Venice Ethics Committee. We strictly followed the ethical guidelines prescribed by the International Society of Ethnobiology.

Consent for publication
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Competing interests
The authors declare no competing interests.

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