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Divergent trajectories of local ecological knowledge among
divided communities: insights from Hutsuls and Romanians of
Bukovina (Romania and Ukraine)

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Coordinatore del Dottorato

ch. prof. Enrico Bertuzzo

Supervisore

ch. prof. Renata Sõukand

Supervisore cotutela

ch. prof. Victoria Reyes-García

Supervisore

ch. prof. Andrea Pieroni

Dottoranda

Giulia Mattalia

Matricola 956443

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Preface

This Ph.D. dissertation is the result of three years of research at the Department of Environmental Sciences, Informatics and Statistics (DAIS) of Ca' Foscari University of Venice (Italy) and at the Institute of Environmental Sciences and Technology (ICTA) of the Autonomous University of Barcelona (Catalonia). This thesis was supervised by professors Renata Sõukand, Victoria Reyes-García and Andrea Pieroni.

This work builds on fieldwork conducted in summers 2018 and 2019 among Hutsuls and Romanians living in Romanian and Ukrainian Bukovina. Unfortunately, the pandemic did not allow carrying out additional fieldwork planned for 2020 and 2021. Nevertheless, participation in international conferences and workshops in the USA and Brazil, as well as my stay at the ICTA, greatly contributed to this dissertation.

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The dissertation consists of an abstract available in English, Romanian, Ukrainian and Italian, an introduction (including the state of the art, a description of the case-study and the main objectives), three central chapters with empirical data corresponding to three peer-reviewed articles published in 2020 and 2021, and an overall conclusion. A list of other publications, as well as dissemination activities I carried out during this Ph.D., can be found in Annex I.

Abstract

English

Plants are crucial for the survival of the humankind. The relationship between people and plants has evolved over centuries, shaped by specific geographical, ecological, social, cultural, economic and political contexts in which people and plants are found. Indeed, it is widely acknowledged that local ecological knowledge systems are not static, but constantly evolve, adapting to new ecological, social, cultural and political conditions. It is also recognized that these local knowledge systems are being increasingly jeopardized by the rapid environmental and socio-economic changes we see today. Among the various socio-economic changes that affect local knowledge, institutional policies have received little scholarly attention, although they can have important impacts on local knowledge. In particular, the impact of policies on local knowledge has only been partially studied in Europe, with a couple of investigations addressing cross-border ethnobotanical knowledge.

In this context, this dissertation aims to further our understanding of how political borders affect local knowledge of the use of wild food and medicinal plants and its transmission, as well as local environmental perceptions. To this end, I worked in the territory of Bukovina, a historical region of Eastern Europe united until the 1940s, when it was divided between the Soviet Union and the Socialist Republic of Romania, currently Ukraine and Romania. Specifically, in this multicultural region, I focused on cross-border communities of Hutsuls and Romanians.

The 135 semi-structured interviews conducted in summers 2018 and 2019 on the use of wild food and medicinal plants, the transmission of such knowledge, and the perception of forest and its resources, revealed three main divergences that constitute the three central chapters of this dissertation.

First, the corpora of knowledge related to plants, especially medicinal plants, are richer among Hutsuls and Romanians living in Ukraine than among Hutsuls and Romanians living in Romania. I argue that this difference originates in the divergent political (and multilingual) context of the two countries, with only Ukraine being influenced by Soviet-derived elements.

Second, ethnobotanical knowledge transmission occurs in divergent forms across the border. Hutsuls and especially Romanians living in Ukraine, in addition to information transmitted

orally, significantly rely on written and visual sources for obtaining information regarding wild food and medicinal plants. Conversely, in Romania, this information is mainly transmitted orally within the family or by local elders.

Third, Hutsuls living across the border share perceptions of forest benefits but differ in their perceptions of the drivers of forest change, possibly due to the diverging political contexts in which they live, and thus diverging forest management policies. In addition, possibly as a result of different socio-economic conditions, Hutsuls living in Ukraine rely more on forest medicinal plants than do Hutsuls living in Romania.

In conclusion, the results of this work suggest that in the context of Bukovina, and possibly beyond it, the creation of new political boundaries can result in different corpora of local knowledge related to wild food and medicinal plants, divergent trajectories of ethnobotanical knowledge transmission strategies, and dissimilar perceptions and use of relevant milieux. I argue that such dissymmetry can be due to the different socio-economic contexts created as a result of different institutional policies. Further research in other geographical contexts with similar cross-border geopolitical situations is required to confirm the results of this work.

Romanian

Plantele sunt esențiale pentru supraviețuirea omenirii. Relația dintre oameni și plante a evoluat de-a lungul secolelor, modelată de contexte geografice, ecologice, sociale, culturale, economice și politice specifice, în care se găsesc oamenii și plantele. De fapt, este recunoscut pe scară largă că sistemele de cunoaștere locale (ecologice) nu sunt statice, dar sunt în continuă evoluție, adaptându-se la noile condiții ecologice, sociale, culturale și politice. Se recunoaște, de asemenea, că aceste sisteme locale de cunoaștere sunt din ce în ce mai compromise de schimbări rapide de mediu și socio-economice. Printre diferitele schimbări socio-economice care afectează cunoașterea locală, politicile instituționale au primit puțină atenție din partea cercetătorilor, deși pot avea un impact important asupra cunoștințelor locale. În special, impactul politicilor asupra cunoașterii locale a fost studiat doar parțial în Europa, cu câteva studii care acoperă cunoștințele etnobotanice transfrontaliere.

În acest context, această teză își propune să aprofundeze înțelegerea noastră asupra modului în care granițele politice influențează cunoașterea locală a utilizării plantelor medicinale și alimentare și transmiterea acestora, precum și a percepțiilor de mediu locale. Pentru a realiza acest lucru, am lucrat în contextul Bucovinei, o regiune istorică a Europei de Est unită până în anii 1940, când a fost împărțită între Uniunea Sovietică și Republica Socialistă România, în prezent Ucraina și România. În special în această regiune multiculturală, m-am concentrat asupra comunităților transfrontaliere dintre Huțuli și români.

Cele 135 de interviuri semi-structurate efectuate în verile 2018 și 2019 privind întrebuințarea plantelor sălbatice, atât pentru hrană cât și în tratarea unor afecțiuni, transmiterea acestor cunoștințe și percepția pădurii și a resurselor sale, au relevat trei divergențe principale care alcătuiesc cele trei centrale capitole ale acestei teze.

În primul rând, corpusurile de cunoștințe legate de plante, în special plante medicinale, sunt mai bogate în rândul huțulilor și românilor care trăiesc în Ucraina decât în rândul huțulilor și românilor care trăiesc în România. Cred că diferența își are originea în contextul lor politic (și multilingv), care a fost influențat de elemente de origine sovietică.

În al doilea rând, transmiterea cunoștințelor etnobotanice are loc în forme divergente de ambele părți ale frontierei. Pe lângă informațiile transmise oral, huțulii și, în special, românii care trăiesc în Ucraina se bazează în mod semnificativ pe surse scrise și vizuale pentru a obține informații despre plantele spontane de uz alimentar și medicinal. În schimb, în România, aceste informații sunt transmise în principal pe cale orală în cadrul familiei sau de

către bătrânii locali.

În al treilea rând, huțulii care trăiesc pe ambele părți ale frontierei împărtășesc percepția beneficiilor pe care le aduc pădurile locale, dar diferă în percepția factorilor care determină schimbarea pădurilor, probabil datorită contextelor politice divergente în care trăiesc și, prin urmare, politici divergente de gestionare a pădurilor. De asemenea, probabil din cauza condițiilor socio-economice diferite, huțulii care trăiesc în Ucraina se bazează mai mult pe plantele medicinale din pădure decât huțulii care trăiesc în România.

În concluzie, rezultatele acestei lucrări sugerează că, în contextul Bucovinei, și poate dincolo de aceasta, crearea de noi limite politice poate duce la diferite corpuri de cunoștințe locale legate de plantele spontane comestibile și medicinale, traiectorii divergente de transmitere a etnobotanice cunoașterea și percepția și utilizarea diferită a mediilor relevante, cum ar fi pădurile. Cred că această disimetrie se poate datora diferitului context socio-economic creat ca o consecință a diferitelor politici instituționale. Cercetările viitoare în alte contexte geografice cu situații geopolitice transfrontaliere similare sunt necesare pentru a confirma rezultatele acestei lucrări.

Ukrainian

Рослини мають вирішальне значення для виживання людства. Відносини між людьми та рослинами розвивалися протягом століть, формуючись у певних географічних, екологічних, соціальних, культурних, економічних та політичних контекстах, де поряд співіснують люди та рослини. Дійсно, загально визнано, що локальні екологічні знання не є статичними, а постійно розвиваються, адаптуючись до нових екологічних, соціальних, культурних та політичних умов. Також слід визнати, що ці локальні системи знань все більше піддаються швидким екологічним та соціально-економічними змінам. Серед різноманітних соціально-економічних змін, які впливають на місцеві знання, не достатня увага приділена інституційній політиці, хоча вона може мати значний вплив на локальні знання. Зокрема, вплив політики на місцеві знання лише частково вивчалися в Європі, причому існує лише кілька досліджень що стосувалися транскордонних етноботанічних знань.

У цьому контексті ця дипломна робота має на меті поглибити наше розуміння того, як політичні кордони впливають на місцеві знання про використання лікарських та диких їстівних рослин та передачу цих знань, а також на оцінку навколишнього середовища.

Для досягнення цієї мети я працювала на території Буковини, історичної області Східної Європи, об'єднаної до 1940 -х років та розділеною між Радянським Союзом та Соціалістичною Республікою Румунія, на сьогодні на території сучасної Україна та Румунія. Зокрема, у цьому багатокультурному регіоні я зосередила увагу на громадах гуцулів та румунів розділених кордоном.

135 напівструктурованих інтерв'ю, проведених влітку 2018 та 2019 років щодо використання диких рослин у їжу, та лікарських рослин, передачі цих знань та оцінки лісу та лісових ресурсів, виявили три основні розбіжності, які складають три центральні глави цієї дипломної роботи.

По -перше, корпуси знань, що стосуються рослин, особливо лікарських рослин, багатші серед гуцулів та румунів, які проживають в Україні, ніж серед гуцулів та

румунів, що проживають у Румунії. Я стверджую, що різниця впливає з їхнього політичного (та багатомовного) контексту, на який вплинули елементи радянського походження.

По -друге, передача етноботанічних знань відбувається у різних формах по різні сторони кордону. На додаток до інформації, переданої усно, гуцули та особливо румуни, які проживають в Україні, значно покладаються на письмові та наочні джерела для отримання інформації про дикорослі продукти харчування та лікарські рослини. І навпаки, в Румунії ця інформація переважно передається усно в сім'ї або від сусідами та досвідченими жителями.

По -третє, гуцули, які живуть по різні сторони кордону, поділяють уявлення про переваги лісу та лісових ресурсів, але різняться щодо сприйняття рушіїв зміни лісових екосистем, можливо, через різну політичну ситуацію, в якій вони живуть, а отже, і через різну політику лісового господарства. Крім того, можливо, через різні соціально-економічні умови, гуцули, які проживають в Україні, більше покладаються на лісові лікарські рослини, ніж гуцули, що живуть у Румунії.

Результати цієї роботи свідчать про те, що в контексті Буковини, а, можливо, і за її межами, створення нових політичних кордонів може призвести до виникнення різних корпусів локальних знань, що стосуються дикорослих рослин що використовуються для їжі та лікарських рослин, різних траєкторій стратегій передачі етноботанічних знань, та несхоже сприйняття та використання відповідних середовищ. Я стверджую, що така дисиметрія може бути зумовлена різним соціально-економічним контекстом, створеним як наслідок різної інституційної політики. Для підтвердження результатів цієї роботи потрібні майбутні дослідження в інших географічних контекстах із подібними транскордонними геополітичними ситуаціями.

Italian

Le piante sono fondamentali per la sopravvivenza del genere umano. La relazione tra l'uomo e piante si è evoluta nel corso dei secoli, modellata da specifici contesti geografici, ecologici, sociali, culturali, economici e politici in cui si trovano persone e piante. È infatti ampiamente riconosciuto che i sistemi di conoscenza (ecologica) locale non sono statici, ma si evolvono costantemente, adattandosi alle nuove condizioni ecologiche, sociali, culturali e politiche. È inoltre riconosciuto che questi sistemi di conoscenza locale sono sempre più compromessi dai rapidi cambiamenti ambientali e socio-economici. Tra i vari cambiamenti socio-economici che interessano i saperi locali, le politiche istituzionali hanno ricevuto scarsa attenzione da parte degli studiosi, sebbene possano avere impatti importanti sui saperi locali. In particolare, l'impatto delle politiche sulla conoscenza locale è stato solo parzialmente studiato in Europa, con un paio di studi che riguardano la conoscenza etnobotanica transfrontaliera.

In questo contesto, questa tesi mira ad approfondire la nostra comprensione di come i confini politici influenzino la conoscenza locale dell'uso delle piante spontanee alimentari e medicinali e della sua trasmissione, nonché le percezioni ambientali locali. Per raggiungere questo obiettivo, ho lavorato nel contesto della Bucovina, una regione storica dell'Europa orientale unita fino agli anni '40, quando fu divisa tra l'Unione Sovietica e la Repubblica Socialista di Romania, attualmente Ucraina e Romania. In particolare in questa regione multiculturale, mi sono concentrato sulle comunità transfrontaliere di hutsuli e romeni.

Le 135 interviste semi-strutturate condotte nelle estati 2018 e 2019 sull'uso di piante spontanee utilizzate a scopo alimentare e medicinale, la trasmissione di tale conoscenza e la percezione della foresta e delle sue risorse hanno rivelato tre principali divergenze che costituiscono i tre capitoli centrali di questa tesi.

In primo luogo, i corpora di conoscenza relativi alle piante, in particolare alle piante medicinali, sono più ricchi tra gli hutsuli e i romeni che vivono in Ucraina che tra gli hutsuli e i romeni che vivono in Romania. Ritengo che la differenza abbia origine nel loro contesto politico (e multilingue), che è stato influenzato da elementi di origine sovietica.

In secondo luogo, la trasmissione della conoscenza etnobotanica avviene in forme divergenti ai due lati del confine. Gli hutsuli e in particolare i romeni che vivono in Ucraina, oltre alle informazioni trasmesse oralmente, si affidano in modo significativo a fonti scritte e visive per ottenere informazioni su piante spontanee ad uso alimentare e medicinale. Al contrario,

in Romania, queste informazioni vengono trasmesse principalmente oralmente all'interno della famiglia o dagli anziani locali.

In terzo luogo, gli hutsuli che vivono ai due lati del confine condividono la percezione dei benefici che i boschi locali apportano, ma differiscono nella percezione dei fattori che determinano il cambiamento forestale, probabilmente a causa dei contesti politici divergenti in cui vivono, e quindi delle politiche di gestione forestale divergenti. Inoltre, forse a causa delle diverse condizioni socio-economiche, gli hutsuli che vivono in Ucraina fanno maggiore affidamento alle piante medicinali del bosco rispetto agli hutsuli che vivono in Romania.

In conclusione, i risultati di questo lavoro suggeriscono che nel contesto della Bucovina, e forse al di là di essa, la creazione di nuovi confini politici può tradursi in diversi corpus di conoscenza locale relativi alle piante spontanee edibili e medicinali, traiettorie divergenti di trasmissione della conoscenza etnobotanica, e percezione e uso dissimili di ambienti rilevanti come i boschi. Ritengo che tale dissimmetria possa essere dovuta al diverso contesto socio-economico creato come conseguenza delle diverse politiche istituzionali. Sono necessarie ricerche future in altri contesti geografici con situazioni geopolitiche transfrontaliere simili per confermare i risultati di questo lavoro.

Catalan

Les plantes són crucials per a la supervivència de la humanitat. La relació entre persones i plantes ha evolucionat al llarg dels segles, conformada per diferents contextos geogràfics, ecològics, socials, culturals, econòmics i polítics en els quals es troben persones i plantes. De fet, és àmpliament reconegut que els sistemes de coneixement ecològic local no són estàtics, sinó que evolucionen constantment, adaptant-se a les noves condicions ecològiques, socials, culturals i polítiques. També es sabut que els sistemes de coneixement locals es veuen cada cop més compromesos per la rapidesa dels canvis ambientals i socioeconòmics que vivim avui en dia. Entre els diferents canvis que afecten el coneixement local, l'efecte de les polítiques institucionals ha rebut poca atenció. En particular, l'impacte de les polítiques sobre el coneixement local només s'ha estudiat parcialment a Europa, amb un parell d'investigacions abordant el coneixement etnobotànic transfronterer. En aquest context, aquesta tesi té com a objectiu aprofundir en la nostra comprensió de com les fronteres polítiques afecten el coneixement local relatiu a l'ús d'aliments silvestres i plantes medicinals i a la transmissió d'aquest coneixement, així com a les percepcions ambientals locals.

Per assolir aquest objectiu, vaig treballar al territori de Bucovina, una regió històrica de l'Europa de l'Est, que als anys quaranta va ser dividida entre la Unió Soviètica i la República Socialista de Romania, actualment Ucraïna i Romania. En aquesta regió multicultural, em vaig centrar en l'estudi del coneixement etnobotànic de les comunitats transfrontereres de hutsuls i romanesos. Els estius 2018 i 2019 vaig realitzar 135 entrevistes semiestructurades sobre l'ús d'aliments silvestres i plantes medicinals, la transmissió d'aquests coneixements, i la percepció del bosc i els seus recursos. L'anàlisi d'aquesta informació estructura els tres capítols centrals d'aquesta tesi.

El primer capítol empíric examina el corpus de coneixement relacionats amb les plantes, especialment medicinals, de les comunitats d'estudi. El resultat principal és que el corpus de coneixements de plantes medicinals i alimentàries és més ric entre els hutsuls i romanesos que viuen a Ucraïna que entre hutsuls i romanesos que viuen a Romania. A la discussió dels resultats, argumento que aquesta diferència s'origina en el context polític (i multilingüe) que viuen els dos països, i en el que només Ucraïna té influències soviètiques.

En el segon capítol empíric examino les formes de transmissió del coneixement etnobotànic als dos costats de la frontera. Hutsuls i, sobretot, romanesos que viuen a Ucraïna, a més de la informació transmesa oralment, també utilitzen les fonts escrites i visuals per obtenir

informació sobre plantes silvestres utilitzades com medicina i aliment. En canvi, a Romania, aquesta informació es transmet principalment oralment dins de la família o per part dels ancians de la comunitat.

El tercer capítol examina percepcions dels boscos. El principal resultat es que els hutsuls que viuen en bandes diferents de la frontera comparteixen percepcions dels beneficis forestals, però difereixen en els seus percepcions dels motors del canvi forestal, possiblement a causa dels contextos polítics divergents que viuen i, per tant, d'estar exposats a diferents polítiques de gestió forestal. A més, possiblement com a conseqüència de diferents condicions socioeconòmiques, els hutsuls que viuen a Ucraïna depenen més dels plantes medicinals que els hutsuls que viuen a Romania.

En conclusió, els resultats d'aquest treball suggereixen que en el context de Bucovina, i possiblement més enllà, la creació de nous límits polítics pot donar lloc a diferents corpus de coneixements locals relacionats amb els usos de plantes silvestres, diferents estratègies de transmissió del coneixement local, i diferents percepcions del medi natural. Aquestes diferències poden ser degudes als diferents contextos socioeconòmics creats com a resultat de diferents polítiques institucionals. Més recerca en altres contextos geogràfics amb es requereixen situacions geopolítiques transfrontereres similars per confirmar els resultats d'aquest treball.

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Introduction

Background

Local Ecological Knowledge in changing political contexts of Europe

Plants are crucial for the survival of humankind as they are major sources of food and medicines, as well as fibres and (building) materials. Over centuries, the relationships between people and plants have developed through a trial-and-error process, with societies building knowledge corpora which often become a relevant part of the local ecological knowledge (hereinafter LEK¹) held by communities (Karunamoorthi et al. 2013). Communities have developed diverse corpora of LEK related to plant use according to the specific geographical, ecological, social, cultural, economic and political contexts in which they live. Such LEK corpora are an important element of biocultural diversity² (McMillen et al. 2014).

Biological and cultural diversity are inextricably linked in such a way that if cultural diversity vanishes, biological diversity is also at risk, and vice versa (Maffi and Woodley 2012). This is especially evident in rural landscapes, which are often the expression of bioculturally-rich multifunctionality, resulting from the centuries-long intertwining of historical, ecological and cultural processes (Agnoletti and Emanuelli 2016). The maintenance of such biocultural landscapes is performed by LEK holders (Pungetti 2013; Agnoletti and Rotherham 2015).

It is widely acknowledged that LEK systems are not static, but constantly evolve, adapting to new ecological, social, cultural and political conditions (e.g., Berkes et al. 2000; Vandebroek & Balick 2012; Gómez-Baggethun and Reyes-García 2013). Nevertheless, biocultural diversity and LEK are being increasingly jeopardized by the current rapid

¹ A site-specific corpus of knowledge concerning “the interplay among organisms and between organisms and their environment” (Olsson and Folke 2001 p. 87).

² “The diversity exhibited by interacting natural systems and human cultures. The concept rests on three propositions: firstly, that the diversity of life includes human cultures and languages; secondly, that links exist between biodiversity and human cultural diversity; and finally, that these links have developed over time through mutual adaptation and possibly co-evolution between humans, plants and animals.” (IPBES)

environmental and socio-economic changes. Researchers have identified climate change and pollution as two of the environmental changes that contribute most to disruptions in local knowledge systems (Whittaker and Fernández-Palacios 2007; Hong 2013; Fernández-Llamazares et al. 2020). Socio-economic features such as land use management, education, economic context and political changes can also greatly affect local plant knowledge. For instance, LEK erosion was found to be associated with major changes in land use management (Babai et al. 2021; Fernández-Giménez and Estaque 2012). Similarly, an improved economic context results in the decline of LEK related to wild food and medicinal plants (Bellia and Pieroni 2015; Mattalia et al. 2021). Indeed, economic shifts promote the adoption of new modes of life disconnected from local ecosystem dynamics and resources. In this sense, the socio-economic shift from primary to secondary and tertiary sectors limits the interactions with (dependence on) the surrounding environment (Folke et al. 2011; Hernandez-Morcillo et al. 2014), and such disconnection affects knowledge transmission, which is a key aspect of the maintenance of LEK.

Despite the extensive literature on LEK, how borders and the different political contexts such borders create contribute to shaping LEK has been very little studied. Yet, considering that the European land surface is crossed by several borders, most of which were established in the last hundred years, and that political borders often do not overlap with cultural and linguistic boundaries, the question of how a fragmented political and socio-economic framework might affect local ecological knowledge becomes more relevant. This is especially true in Eastern Europe, where several borders were established either after World War II (around 1945) or after the collapse of the Soviet Union (early 1990s). This phenomenon has led to the splitting of culturally homogeneous communities by newly established borders, and to the possibility that a body of homogeneous local knowledge evolves differently according to different (and possibly divergent) national policies.

This premise is not new. Molnár and Fikret (2018) warned that policies can profoundly affect biocultural landscapes and the underlying LEK that maintain these landscapes. Yet, how policies, implemented in different political systems, affect LEK related to wild food and medicinal plants remains largely unexplored in Europe. The first attempt to address this issue was carried out by Sõukand and Pieroni (2016) who compared ethnobotanical data obtained from fieldwork conducted among a minority group living across the Ukraine-Romania border with historical sources and the State Pharmacopeia of the Soviet Union. Cross-border differences in ethnobotanical uses were detected and the authors suggested that these

differences could be the result of the different socio-economic scenarios in the two areas (Sõukand and Pieroni 2016). Along the same border, but working among another ethnolinguistic group, Stryamets et al. (2021) found that the use of wild food plants differs between ethnolinguistic groups, possibly due to their contact with the main national culture, shaped by different policies. A third ethnobotanical cross-border study conducted at the Georgia-Turkey border suggests that, despite a common cultural background and homogeneous species distribution, plant-based medicinal remedies were more common in Georgia than in Turkey. The authors argue that these differences are due to the different recent political histories of the two countries, which has made Georgians multilingual and thus able to access medicinal knowledge in Russian literature and incorporate it into their local knowledge (Kazanci et al. 2020).

Another important aspect of local understanding and relationship with the environment, which is crucial for its incorporation into environmental management policies, concerns how local people perceive the surrounding environment. The importance of different political contexts in shaping environmental perceptions among local communities in Europe has been addressed by only a few studies with regards to forests (Paletto et al. 2013; Mikusiński and Niedziałkowski, 2020, whose main findings shed light on the relevance of overlapping local community perceptions and public policies for successful forest management), meadows (e.g. Lindemann-Matthies et al. 2010; Ivaşcu et al. 2016, who highlight the need for considering local classifications and aesthetic appreciation of meadows for their maintenance and touristic attractivity), and lakes (e.g. Wood et al. 2021; Artell 2013, who found that Finns perceive water reservoirs as important (recreational) resources and are willing to pay for improving their quality). No studies have addressed such perceptions from a cross-border perspective.

Taking advantage of the plurality of European borders, this study provided insights into the differences in the LEK of culturally homogeneous minority groups living in an area with common environmental conditions, but which have been split between two countries and therefore nowadays live in different social, economic and political contexts. This combination of common and distinct aspects could be a crucial tool for a better understanding of the factors that affect LEK dynamics. Indeed, cross-cultural ethnobotany is a novel and valuable tool for addressing the variability of LEK associated with wild food and medicinal plants.

Understanding how political borders affect LEK related to the use of wild food and medicinal

plants, ethnobotanical knowledge transmission, and local perceptions of the environment is the main concern of this dissertation. My research mainly focuses on the use of wild food and medicinal plants, an important resource for local communities³ living in Bukovina (Leahu et al. 2019), a region located in Romania and Ukraine and crossed by the Carpathian Mountains.

Motivation and relevance to the environmental sciences

Today, most European communities no longer depend on wild plants for food and medicine, yet in some contexts the use of wild plants continues to be popular or has recently witnessed a revival. For instance, in the Mediterranean context, several wild plants are still commonly collected especially for food purposes (see Hadjichambis et al. 2008 for a circum-Mediterranean overview; and among the most recent publications Gras et al. 2020; Motti et al. 2020). In the Northern European context, a new trend towards wild plant consumption seems to be emerging, with wild food plants being an important aspect in avant-garde restaurants (Łuczaj et al. 2012).

Local knowledge of wild food plants is of crucial importance in several contexts of Eastern Europe as it can contribute to food security, especially when crop failures or human-induced famines occur (Quave and Pieroni, 2015). This knowledge is also important for shaping and maintaining local identity (Ceuterick et al. 2008). Moreover, medicinal plant knowledge can be very important in remote, ethnic minority villages, where wild resources complement the state healthcare system (Vandebroek, 2013). Finally, the LEK held by local communities often includes practices prone to biodiversity conservation (Berkes 2012). Indeed, biodiversity is intimately tied to human well-being and especially to the well-being of those communities that have had a long history of interaction with the surrounding environment (Díaz et al. 2006). Considering that biological diversity is declining at an unprecedented rate (IPBES 2019) and this leads to losses in cultural diversity, the corpus of LEK held by local communities can be a crucial tool for understanding ecosystem processes and practices that can favour resilience (Mamum 2010; Berkes et al. 2000).

The study of LEK, especially in bioculturally-rich contexts, is relevant to the environmental

³ together with indigenous people are generally defined as “ethnic groups who are descended from and identify with the original inhabitants of a given region” (Reyes-Garcia et al. 2019 p. 3)

sciences, as it can further our understanding of the characteristics (e.g., physical, chemical and biological), and relationships between different elements, of the surroundings in which the studied community live. Ethnobiology, as a multidisciplinary field, integrates various disciplines of the environmental sciences (e.g., botany, anthropology, sustainable development). Indeed, the study of complex systems, such as the LEK held by rural multi-ethnic communities living across borders, requires the integration of different perspectives from various scientific fields. The combination of environmental sciences, with their multifaceted aspects, and social sciences can contribute greatly to the study of the complexity of current global changes.

The geographical and historical context

Bukovina is a good case study in which to address cross-border comparisons as the current political border split two homogeneous ethnic communities, Hutsuls and Romanians, into two different socio-economic and governmental contexts: present-day Romania and Ukraine. Furthermore, Hutsuls and Romanians represent an ideal case to study how borders affect the use of plants for at least three reasons: a) Hutsuls and Romanians had been living in the same political context for centuries, before strict border closing in the 1940s; b) Hutsuls and Romanians live in adjacent areas within and across countries, thus sharing similar ecological landscapes; and c) despite residing next to each other, the two groups do not share a cultural background.

Bukovina: united and divided

Bukovina, a historical region currently divided between Ukraine and Romania, is a good example of the lack of congruence between political and cultural borders. The region was carved out by the Habsburgs in 1774-1775 and for the following 140 years it was the easternmost region of their Empire (Fishers 2019). The region was primarily inhabited by both Romanians and Ukrainians, yet many other minorities were also present, including Germans, Poles, Hungarians, Hutsuls, Armenians, and Jews in urban contexts. When the Habsburg monarchy collapsed, Bukovina became part of Romania, undergoing a Romanization process in the years 1918-1940. The Second World War established the creation of the border with the Soviet Union, which took control of the Northern part of Bukovina. At that time, many Romanians moved to Southern Bukovina, while Germans went back to Germany and two thirds of the Jewish population were deported to Siberia

(Fishers 2019). Minor demographic changes also occurred in Hutsul territories. Since the early the 1990s, both Romania and Ukraine have attempted to undertake a slow and complex transition from a communist economy to a capitalist one. These processes have occurred in parallel in Romanian and Ukrainian communities. Yet, since the 2000s, Romania has experienced an important migratory flow to Western Europe, which has mainly affected Romanians living in Romania and those living in Ukraine but possessing a Romanian passport. Yet, the inclusion of Romania in the European Union in 2007 has exacerbated the divergences. On both sides of the border, Hutsuls who dwell in mountainous, remote and culturally-strong contexts, slowly initiated (seasonal) migrations to Western Europe, due in part to the three-month visa-free policy for Ukrainians travelling to Europe in force since 2017 (Drakokhrust et al. 2019). Moreover, especially in the areas inhabited by Romanians, joining the European Union has resulted in an increase of activity involving contraband, which has become an important economic activity (Cassidy 2017) due to the higher taxation on cigarettes in Romania (Bar-Koefelis and Dopierała 2014).

From an ethnobotanical perspective, while the richness of biodiversity in the Carpathian Mountains is widely acknowledged (e.g., Bálint et al. 2011), only a few studies documenting LEK have been conducted in the area (in the Czech Republic by Pawera et al. (2017); in Romania by Papp et al. (2013); Łuczaj et al. (2015); in Ukraine by Pieroni and Sõukand (2017); Sõukand and Pieroni (2016, also in Romania)).

Overall, the area represents a good opportunity in which to study how LEK is affected by changes in political contexts given the socio-economic and political asymmetry of Northern and Southern Bukovina, while being homogenous from an ecological and cultural perspective. Indeed, in Bukovina, Hutsul communities primarily reside in mountainous regions including the Carpathians (about 65% of the land surface), while Romanians dwell mainly pre-Carpathian and plain areas (the remaining 35% of the land surface).

Hutsuls: Carpathian highlanders

The Hutsuls are a minority ethnic group living in the Carpathian Mountains of Romania and Ukraine. Their origins, including that of their language, are still debated. Hutsuls are well known for their handicrafts, such as handwoven textiles and embroidery, and their peculiar architecture (Figlus 2009). On the Ukrainian side of the border, Domashevsky (2001) recorded 80 Hutsul settlements with a total of over 150,000 inhabitants. On the Romanian side, the Hutsul population is considerably smaller, with approximately 10,000 people

(Saghin et al. 2017).

Traditional Hutsul subsistence activities include cow and sheep breeding and tending to small home gardens, where they mainly grow potatoes, beetroots and cabbage. Pastoralism, comprising both individual grazing and communal haymaking, represents an important and identitarian activity for Hutsuls (Amato 2020). Hutsuls recognize the unicity of their local ecological practices regarding small-scale agriculture and sylviculture, as well as food and wood processing. A recent study suggests that Hutsuls are greatly concerned about the potential impacts that globalization could have on their minority identity (Saghin et al. 2017), particularly because, due to the lack of formal employment, many young Hutsuls migrate to urban areas of Europe, which has profound impacts on cultural maintenance (Saghin et al. 2017).

Romanians of Northern and Southern Bukovina

Romanians have lived in Bukovina for centuries (Bureiko et al. 2021). The Habsburg census reported that in 1900 Romanians co-existed with Ukrainians (and the many other ethnic groups), with either constituting an absolute majority (Statistischen Zentralkommission 1907 in Bureiko et al. 2021). After the separation of Bukovina into its Northern and Southern portions (at the beginning of the 1940s), Romanians living in the part occupied by the USSR moved to the Southern part (Romania). However, some Romanian communities persisted in the Northern region and some Ukrainians in the Southern area. Today, the approximately 151,000 Romanians living in Ukraine are mainly located in the areas of Hertsa, Hlyboka and Storozhynets (Kuras and Pirozhkov, 2004). Romanians of Northern and Southern Bukovina live in areas more suitable for agriculture compared to areas in which Hutsuls live. Indeed, Romanians generally inhabit low(er) lying lands that are flat or mildly hilly, whose climate allows for the cultivation of corn, an important ingredient of local diets. In comparison to areas inhabited by Hutsuls, fewer sheep and more cows are raised in the areas occupied by Romanians, and meadows prevail over forest patches. Most Romanians on both sides of the border are engaged in either paid employment or small-scale farming. Despite living next to each other, Hutsuls and Romanians across the border do not share a mother tongue (being either Hutsul or Romanian) or culture.

The framework

This dissertation was carried out within the ERC-funded DiGe project. The DiGe project

aims to understand the mechanisms of change in the way in which wild food and medicinal plants are obtained, managed and perceived by local communities affected by centralization policies (e.g., policies implemented in the Soviet Union). In order to achieve this understanding, cross-border and cross-cultural ethnobotanical studies have been carried out in eight Eastern European countries. Specifically, the project consists of four main cross-border regions which were united before the 1940s (Karelia and Bukovina) or 1991 (Setomaa and Dzukja).

Main aims and structure of the dissertation

Within this framework, the study of the transboundary ethnobotany of local communities divided by a recently established political border, such as that of Hutsuls and Romanians, can provide new insights into understanding the mechanisms of change in LEK.

This work aims to identify the main similarities and differences in a) LEK related to wild food and medicinal plants, b) LEK transmission strategies used by Hutsuls and Romanians currently living in Romania and Ukraine, and c) environmental perceptions (i.e., of forestland) among Hutsuls living across the border.

My main working hypothesis is that different socio-political contexts on each side of the border may have unevenly influenced knowledge related to wild food and medicinal plants, how this knowledge is transmitted, and how the forest is perceived. Specifically, I expected differences in the LEK of Hutsuls living on the two sides of the border as the result of the disparate political systems: the strong centripetal power of the Soviet Union may have introduced pan-Soviet elements into Ukrainian Hutsul LEK, whereas the lack of implementation of Ceaușescu policies in mountain areas of Romania may have left the LEK unchanged.

I examine this question in the first chapter of this dissertation (Mattalia et al. 2020), finding that despite a common cultural and linguistic background, the transmission of knowledge related to wild food and medicinal plants occurred differently on the two sides of the border. Among Hutsuls living in both countries, family was a primary source of ethnobotanical knowledge; however, in Romania knowledge from other sources was very limited, whereas in Ukraine Hutsuls identified several other sources such as books, magazines, newspapers, the Internet and television. This was especially evident for medicinal plants. Romanian Hutsuls used almost exclusively locally available plants, whereas Ukrainian Hutsuls often

reported novel plants such as *Aloe vera*, *Aronia melanocarpa* and *Elaeagnus rhamnoides*, which seems to indicate a hybridization of the local body of knowledge with foreign elements originating in the Soviet context.

To assess the cross-cultural validity of this finding, in the second chapter (Mattalia et al. 2021a), I explore the same research questions regarding the use of wild medicinal plants and ethnobotanical knowledge transmission but using as a comparative example a different ethnolinguistic group living in the area: Romanians living across the Bukovinian border. I found that Romanians living in Romania made consistent use of local medicinal plants (many people mentioned the use of a few taxa), while Romanians living in Ukrainian Bukovina overall reported to use more taxa, but each plant was mentioned by only a few people. The cross-cultural comparison with Hutsuls (i.e., first chapter) showed that medicinal knowledge was more homogeneous among Hutsuls and Romanians living in Ukraine, yet many similar uses were found among Romanian communities across the border. Reinforcing the findings of the first chapter, in the analysis of the second chapter, I found several plant uses common among the groups living in Ukraine, yet not among Hutsuls and Romanians living in Romania. This possibly indicates a process of knowledge homogenization during the 50 years in which Ukrainian Bukovina was part of the USSR.

In the third chapter (Mattalia et al. 2021b), with the aim of understanding how different political contexts can affect perceptions of the forest, I use a cross-border perspective to analyze the most important element of Hutsul land and their foodscape: the forest. I conduct a comparison of the use and perceptions of the forest and its products among Hutsuls living across the Romanian-Ukrainian border. The main findings indicate that Hutsuls living on the two sides of the border share perceptions regarding forest benefits but differ on perceptions of the drivers of forest change, possibly due to the differing political contexts and thus diverging forest management policies. Also, possibly due to different socio-economic conditions, Hutsuls living in Ukraine rely more on forest medicinal plants than do Hutsuls living in Romania. I conclude that the perceptions of local communities should be considered in landscape management decisions, especially when those communities dwell in border areas where transboundary environmental management should be considered and promoted for (re)building bridges across divided generations and landscapes.

This dissertation concludes by summarizing the main contributions of my work and future research lines.

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Chapter 1: Knowledge transmission patterns at the border: Ethnobotany of Hutsuls living in the Carpathian Mountains of Bukovina (SW Ukraine and NE Romania)

Introduction

The current global changes demand thorough analysis of not only ecological knowledge *per se*, but also how such knowledge is produced, shared and used (Hopping et al. 2016). Indeed, ecological knowledge is a valuable system, which can significantly contribute to a better understanding of the current socio-economic and environmental changes occurring all over the world (Mamun 2010; Naess 2013). These bodies of knowledge are seriously endangered by urbanization and the increasing adoption of new modes of life disconnected from local ecosystem dynamics and resources (Folke et al. 2011). In addition, a widespread tendency of formal education (e.g. literature) to downplay local resources and knowledge has been observed (Cruz García 2006), thus leading to knowledge homogenization and standardization (Pieroni and Sõukand 2017; Mamedov et al. 2005).

Ethnobotanical knowledge can be considered as part of Local Ecological Knowledge (LEK) and it can be, but not necessarily is, regarded as traditional. Indeed, LEK “concerns the interplay among organisms and between organisms and their environment. LEK may be a mix of scientific and practical knowledge; it is site-specific and often involves a belief component” (Olsson and Folke, 2001). Berkes et al. (2000) defined Traditional Ecological Knowledge (TEK) as “a cumulative body of knowledge and beliefs, handed down through generations by cultural transmission, about the relationship of living beings (including humans) with one another and with their environment.” As observed by Olsson and Folke (2001), the specific characteristics of TEK lie in its “historical and cultural continuity of resource use”.

These two definitions of ecological knowledge are not in opposition, but rather, as largely accepted by the majority of ethnobiology scholars, both TEK and LEK define a complex and heterogeneous body of folk knowledge, practices, and beliefs related to the natural

environment. However, solely for the instructive aim of a better understanding of the different “nature” of these bodies of knowledge in the current context, in this article we adopt the term TEK when referring to a system in which knowledge and practices are mainly orally transmitted (e.g. pre-industrial contexts), while we use the term LEK to refer to a system in which the borders between written (or in other words “standardized”) and oral forms of knowing nature and practicing this knowledge are more blurred.



Figure 1. Bukovinian Carpathian landscape, Lupcina, Romania; July 2019; Photo by N. Stryamets.

Van den Boog et al. (2017 and references within) discussed and categorized the dynamics of LEK transmission into vertical (between generations within the family), horizontal (between people of the same generation) and oblique (between generations not belonging to the same family). The evolving dynamics of ethnobotanical knowledge transmission have been found to be affected by not only exposure to a market economy (Reyes-García et al. 2005; McMillen 2012), but also socio-economic changes (Zarger and Stepp 2004) and political circumstances (Mamedov et al. 2005).

Hutsuls are an ethnic group living in the Carpathian Mountains of Ukraine and to a lesser extent Romania. These communities have been recently studied from an ethnographic perspective (Saghin et al. 2017; Figlus 2009) as well as an ethnobotanical one (Pieroni and Sõukand 2017; Sõukand and Pieroni 2016).

Over the last few years, cross-border ethnobotany has received increasing attention from scholars (Sõukand and Pieroni 2016; Ozturk et al. 2018; Akgul et al. 2018) as it is an excellent tool for exploring the effects of different social and political contexts on LEK. In this study, we examine culturally homogenous Hutsul communities living in similar

mountain landscapes (Figure 1), yet separated by a border created in the 1940s when Northern Bukovina was annexed by the Soviet Union and Southern Bukovina remained part of the Kingdom of Romania. The aim of this study, therefore, is to document and discuss the different dynamics of LEK transmission among Hutsuls living in Ukraine and Romania and to explore whether the different social, political, and economic conditions that developed after border creation have affected these dynamics.

Methods

Study area and historical background

The interviews were conducted in Bukovina (Figure 2), a region of Eastern Europe characterized by an extensive forested area especially in proximity to the Carpathian Mountains. This region belonged to the Hapsburg Empire for over 140 years until 1918, when it became part of the new Kingdom of Romania. In 1940, the Ribbentrop Molotov Pact split this region into two parts: Northern Bukovina was annexed by the USSR and thus a new border was created. After a few years of uncertain borders, in 1944 Southern Bukovina was assigned to Romania, and since 2007 it has been a member of the European Union, whereas Northern Bukovina, after the collapse of the Soviet Union in 1991, became part of independent Ukraine. While Northern Bukovina underwent a process of homogenization and centralization promoted by the USSR, Southern Bukovina was not heavily affected by Romanian collectivization policies due to its limited economic interest.

Over one century ago, Bukovina was a multicultural and multi-religious mosaic composed of Romanians, Ukrainians, Jews, Armenians, Roma people, Hungarian Székelys, Russian Old Believers (Lipovans), Germans (mainly clerks), Slovaks, Poles, and Tatars (Fisher and Röger 2019; Kot 2007).

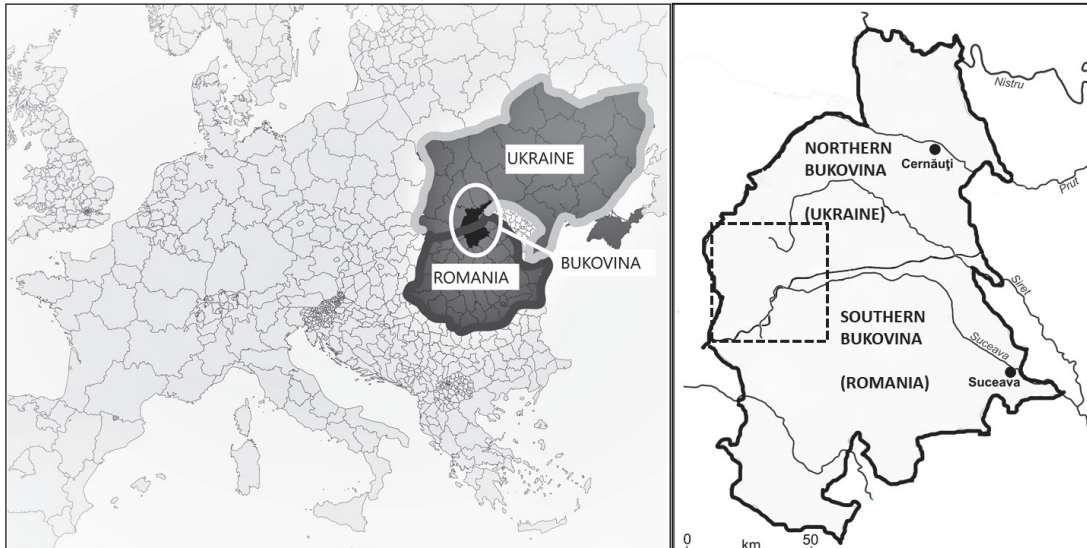


Figure 2. Maps of the study area.

Currently only a small portion of such cultural diversity is maintained, as linguistic and ethnic minorities have undergone a process of homogenization (Kołodziejska-Degórska 2012). Among these minorities are Hutsuls who live in the Carpathian Mountains of the Suceava district of Romania and the Cernivtci, Ivano-Frankivs'k and Zakarpatska provinces of Ukraine. Hutsuls speak a local language which they themselves consider to include elements of Ukrainian, Polish, German and Hungarian (Saghin et al. 2017). In Romania, children are taught both in Romanian and Ukrainian in school, while at home they mainly speak the Hutsul language. In Ukraine, they attend school in Ukrainian and use Hutsul for informal conversations. The main economic activities of both Romanian and Ukrainian Hutsuls are small-scale mixed farming and non-wood forest product exploitation. All interviewed Hutsuls belonged to the Orthodox Church.

The climate of the area is classified as Dfb, a humid continental climate, without a dry season and with warm summers. Annual precipitation is around 775 mm, which is mainly concentrated in June and July. The coldest month is January when average temperature is -5.5 °C and the warmest is July at 16°C.

Sampling and interviews

Sixty-one Hutsul informants were interviewed in Romanian and Ukrainian Bukovina between June 2018 and July 2019. Thirty in-depth interviews were gathered in the municipalities of Brodina, Ulma and Izvoarele Sucevei, in the district of Suceava, Northern Romania, while thirty-one interviews were conducted in the districts of Putyla (main villages in which interviews were conducted include Kyselytsi, Shepit, Serhii, Foshky, Parkulyna,

Ryzha) and Vyzhnytsia (Dolishnii Shepit) in the province of Cernivtci, Southern Ukraine (Figure 3). Altitude of the villages ranges from 600 to 1000 m a.s.l.

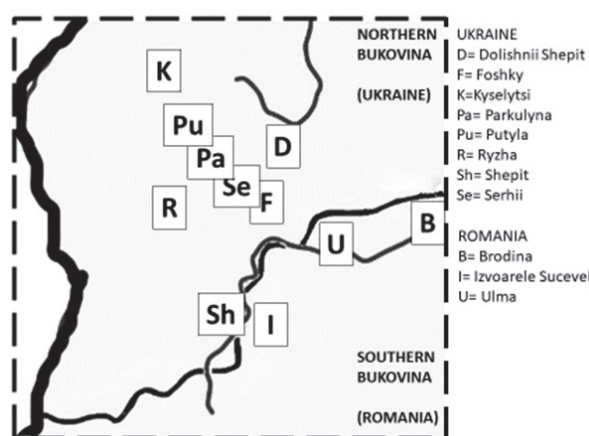


Figure 3. Map of the specific study area.

Informants were conveniently selected (we interviewed people walking on the street, working in their gardens or talking in cafes) and when possible we used the snowball method. We strictly followed the ethical guidelines prescribed by the International Society of Ethnobiology (ISE, 2006) and the study protocol was approved by the Ethical Committee of Ca' Foscari University of Venice.

We used semi-structured interviews to obtain qualitative and quantitative data regarding the use of plants for culinary and medicinal purposes (starting with culinary use). Specifically, we asked interviewees what plants they harvest, for what purpose, and how they prepare them. In addition, we asked informants the source of such knowledge, i.e. from whom or where did they learn it. In some cases, we deemed it useful to draw a timeline indicating when each informant started using each plant. When possible, we harvested the mentioned plants together with the interviewees in order to collect and identify voucher specimens. Voucher specimens collected in Ukraine are stored in the “Roztochya” Nature Reserve (Ukraine) bearing codes NB001-NB259, while those collected in Romania are stored in the Herbarium of Ca' Foscari University of Venice (Italy) bearing codes SB001-SB094. Voucher specimens were identified using the “The Plant List” (2013) and “Flora Europaea” (Tutin et al. 1964). Plant families were classified according to Stevens (2001 onwards). Interviews were held in Romanian or Ukrainian according to the preference of the interviewees. In Romania, many interviewees answered using a mixture of Romanian, Ukrainian or the Hutsul language, while in Ukraine they tended to stick to Ukrainian.

Data Analysis

Gathered data on the use of plants for various purposes were entered into an Excel spreadsheet. We structured emic categories into detailed use-reports (DUR), where each interviewee mentioned a specific use (e.g. abdominal pain) of a plant part (e.g. aerial parts or roots) for a specific preparation (e.g. tea or infused in alcohol). The spreadsheet included informant code, language of the interview, plant parts used, scientific name, family assignment, local name (Ukrainian and Hutsul names were transliterated using the system adopted by the Cabinet of Ministers of Ukraine (Slovnyk 2010)), mode of preparation, time of use (always, in the past, recently abandoned, recently adopted), medicinal use, food use, source of knowledge, and comments. In addition, for medicinal uses, we related ICD-11 medicinal categories (World Health Organization 2018) to reported emic categories (e.g. good for the stomach) for better comparison. In addition to the ICD-11 (International Classification of Diseases) categories, we included a general health category including mainly “general symptoms” and some unspecified emic categories.

We considered only wild plants for food purposes, while we also included cultivated plants for medicinal purposes. We considered as ‘wild’, plants that grow without intended cultivation. This category mainly consists of native and naturalized species, but also plants not cultivated for food or medicinal purposes (e.g. *Tilia cordata*), as well as species that are generally gathered from the wild but can also be cultivated (e.g. *Rubus idaeus*).

To compare Romanian and Ukrainian Hutsuls, we calculated the Jaccard Similarity Index (JI) following the methodology of González-Tejero et al. (2008):

$$JI = (C / (A + B - C)) \times 100$$

where A is the number of species in sample A, B is the number of species in sample B and C is the number of species common to both A and B. An index value close to 100 indicates that the two groups are very similar, while a value close to 0 indicates that are very different.

In order to calculate the proportion of each knowledge transmission strategy we assigned a total of 1 point to each source of knowledge indicated by the interviewee. Therefore, if the interviewee reported one source (e.g. parents), we assigned a value of 1; two sources (e.g. books and grandparents), we assigned 0.5 to each; three sources, 0.33 to each; and four sources, 0.25 to each. Later, we summed these values in the emic categories of knowledge source mentioned by the interviewees on both sides of the border.

Results and Discussion

We recorded a total of 118 food and medicinal plants from 107 genera and 53 families. The most well represented families were Asteraceae, Rosaceae and Lamiaceae. Among Hutsuls of Northern Bukovina we recorded 107 taxa, while there were 72 taxa among Hutsuls of Southern Bukovina, and 60 taxa common to both. The most used plants were *Vaccinium myrtillus*, *Rubus idaeus* and *Urtica dioica*. These were the most used in both Northern and Southern Bukovina and thus we can confirm their importance as Hutsul cultural markers as previously suggested by Söukand and Pieroni (2016).

Food taxa

The interviewed Hutsuls reported a total of 47 taxa used for food preparations (Table 1).

Table 1. Recorded food taxa in Northern and Southern Bukovina.

Legend: *** denotes in the past. Plant names mentioned by Ukrainian Hutsuls are reported in Cyrillic (with transliteration). Plant names mentioned by Romanian Hutsuls are reported in the Latin alphabet. Plant names not reported in Romanian or Ukrainian dictionaries or in publications available for the area (e.g. Pieroni and Söukand, 2017), and are therefore probably Hutsul names, are marked with a §. Russian names are marked with a ^.

Latin name, Family and Voucher specimens	Local names	Used part(s)	Preparation	DUR	
				RO	UA
<i>Acer</i> sp.pl. including <i>A. pseudoplatanus</i> L. (Sapindaceae) NB225; NB226	Paltin; явір; клен (Yavir; klen)	Sap	Drink		4
		Fruits (dried)	Tea	4	
<i>Achillea millefolium</i> L. (Asteraceae) SB011; SB050; SB074 NB007; NB017; NB039	Coada șoaricelului; деревій (Derevii)	Aerial parts (dried)	Tea	3	2
<i>Armoracia rusticana</i> P.Gaertn., B.Mey. & Scherb. (Brassicaceae) SB031 NB028	Hrean; хрень; хрін; хреню (Khren; khrin; khreniu)	Roots	Salad (with beetroots)	13	3
			Seasoning	7	
			Raw		5
			Pickles (cucumbers, tomatoes)		7
		Fermenting		1	
		Leaves	Pickles (cucumbers)	1	
Whole plant	Seasoning	1			
<i>Arnica montana</i> L. (Asteraceae)	Гарник; арник (Harnyk; arnyk)	Aerial parts (dried)	Tea	2	3
<i>Aronia melanocarpa</i> (Michx.) Elliott (Rosaceae)	чорна рябіна (Chorna riabina^)	Fruits	Kvas		1
<i>Atriplex hortensis</i> L. (Amaranthaceae) SB004; SB018	Lobodă; нати́на§; лобода (нату́па§; loboda)	Aerial parts	Soup	8	
		Leaves	Sarmale	2	

<i>Betula pendula</i> Roth (Betulaceae) NB041; NB049; NB115	Береза (bereza)	Sap	Drink		11
			Strong alcohol		5
		Leaves	Mixed tea		1
<i>Carum carvi</i> L. (Apiaceae) SB007 NB037	Săcărică; Cmin; Hmel; хміль§; тмин; хміль польовий§; кмин (Khmil§; tmyn; Khmil polovui§; kmyn)	Aerial parts	Tea	3	
			Seasoning	2	
		Seeds	Tea	1	5
			Seasoning	2	
			Fermenting	3	
			Pickles		2
Bread additive		3			
<i>Chenopodium album</i> L. (Amaranthaceae) SB022 NB139	Lobodă; нати́на§; лебеда (Natyna§; lebeda)	Aerial parts	Soup	3	2
			Stewed (with cream)	1	1
			Seasoning (dried)	1	
<i>Cichorium intybus</i> L. (Asteraceae)	петрів батіг (Petriv batih)	Aerial parts	Tea		1
<i>Coriandrum sativum</i> L. (Apiaceae)	колендра (Koliendra)	Seeds	Smoking (meat seasoning)		1
<i>Corylus avellana</i> L. (Betulaceae) SB089	Alune	Fruits	Raw	5	
<i>Crataegus</i> sp. pl. including <i>C. monogyna</i> Jacq. (Rosaceae) NB006; NB066	Глід (Hlid)	Fruits	Tea		2
<i>Epilobium angustifolium</i> L. (Onagraceae) NB057	іван чай, демник§; ;имник§ (ivan chai, demnyk§; dymnyk§)	Aerial parts	Tea		3
<i>Equisetum</i> sp. pl. including <i>E. arvense</i> L.; <i>E. sylvaticum</i> L. (Equisetaceae) SB020 NB068, NB093, NB113, NB114	Barba ursului; Coada calului; Padivolos; хвоц польовий, падиволос§; (Khvoshch pollovui, padyvolos)	Aerial parts	Tea	2	1
<i>Fagus sylvatica</i> L. (Fagaceae) SB060, NB168	Fag; бук (Buk)	Wood	Smoking (meat)	19	1
<i>Fragaria vesca</i> L. (Rosaceae) SB094 NB004, NB015, NB056	Fragi; Frăguța; ягода§; ягоди; ягода черлена§; (yahoda§; yahody§; yahoda cherlena§)	Fruits	Raw	4	2
			Jam	14	9
			Compote	3	1
			Dessert	2	
			Tea	2	
			Juice	1	1
			Syrup	2	
Frozen		1			
<i>Gentiana</i> sp. pl. possibly including <i>G. lutea</i> L. and <i>G. asclepiadea</i> L. (Gentianaceae)	Gingiura	Aerial parts	Infused in strong alcohol	4	
<i>Humulus lupulus</i> L. (Cannabaceae) SB081 NB182	Hamei; хміль (Khmil)	Flowers	Beer	6	
			Bread starter		2
<i>Hypericum</i> sp. pl. including <i>H. perforatum</i> L. (Hypericaceae) SB068; SB092	Pojarnița; Sunătoare; звіробій; звіробой (Zvirobii; zviroboi)	Aerial parts	Tea	3	8

NB005, NB034, NB046, NB085					
<i>Levisticum officinale</i> W.D.J.Koch (Apiaceae)	Любисток (Liubystok)	Aerial parts	Tea		2
<i>Matricaria chamomilla</i> L. (Asteraceae) SB002; SB019 NB127	Mușețel; Romaniță; ромашка; романица; романець; румениць (Romashka; romanitsa; romanets; rumienyts)	Aerial parts	Tea	4	9
<i>Mentha</i> sp. pl. (Lamiaceae) SB014; SB016; SB034; SB096 NB079, NB080, NB097	Mentă de doi culoari; менти; Mentă tare; Minta; мята (Miata)	Leaves	Tea	5	1
<i>Origanum vulgare</i> L. (Lamiaceae) NB033; NB055; NB021	Материнка (Materynka)	Aerial parts	Tea		4
			Seasoning		1
<i>Oxalis acetosella</i> L. (Oxalidaceae) NB058	Квасениця звичайна (Kvasenytsia zvychaina)	Leaves	Salad		1
			Snack		1
<i>Papaver rhoeas</i> L. SB044a; SB044b; SB044c	Mac	Seeds	Food additive	1	
<i>Picea abies</i> (L.) H. Karst. (Pinaceae) SB008; SB021 NB043	Brad; смерека (Smereka)	Sprouts	Jam	2	
		Wood	Smoking (meat)	1	2
<i>Plantago major</i> L. (Plantaginaceae) NB022; NB047; NB132	Подорожник (Podorozhnyk)	Aerial parts	Tea		2
<i>Populus tremula</i> L. (Salicaceae)	Осика (Osyka)	Wood	Smoking (meat)		1
<i>Primula veris</i> L. (Primulaceae)	Cioboțica cucului	Aerial parts	Tea	6	
<i>Quercus</i> sp. pl. including <i>Q. robur</i> L. and <i>Q. rubra</i> L. (Fagaceae) SB056 NB160	Stejar; Duba; дуб (Dub)	Leaves	Pickles (cucumbers)		3
		Young branches	Pickles	6	
<i>Rosa canina</i> L. (Rosaceae) SB062 NB016; NB083	Măceș	Fruits	Tea	1	
<i>Rosa rugosa</i> L.; <i>Rosa centifolia</i> L. (Rosaceae) SB023	Trandafir; роза (Roza)	Petals	Jam	14	
			Jelly	2	
			Syrup	4	
			Tea	4	
<i>Rubus</i> sp. pl. including <i>R. caesius</i> L. and <i>R. fruticosus</i> L. (Rosaceae) SB083 NB010; NB062; NB063	Чорниця; ожина; ежевика (Chornytsia; ozhyuna; yezhevika) Mure; чорниця (Chornytsi)	Fruits	Jam	9	3
			Raw	2	
			Compote	1	1
			Infused in alcohol	2	
			Juice	1	1
			Syrup	2	
		Aerial parts	Tea	2	
Flowers	Tea		1		
<i>Rubus idaeus</i> L. (Rosaceae) SB009; SB071 NB081	Змеурă; малина (Malyna)	Aerial parts	Tea	3	4
		Fruits	Juice	5	6
			Raw	7	2
			Compote	6	7
			Jam	18	13

			Dessert	1	
			Syrup	4	
			Frozen		2
			Tincture		1
<i>Rumex acetosa</i> L. (Polygonaceae) NB081	Квас§; щавель; квасок§ (kvas§; shchavel; kvasok§)	Leaves	Soup		21
			Salad		2
			Snack		2
<i>Rumex alpinus</i> L. (Polygonaceae) SB067 NB003	Ștevie	Leaves	Stewed (with cream)	1	
<i>Sambucus nigra</i> L. (Adoxaceae) SB084 NB054	Сос; бузина (Buzyna)	Flowers	Juice	2	
			Tea	1	
		Fruits	Jam		2
<i>Sorbus</i> sp. pl. including <i>S. aucuparia</i> (Rosaceae) SB055 NB232	Scoruș; щкорох§ (shchkorokh§)	Flowers	Tea		1
		Fruits	Kvas		1
			Various	4	
<i>Taraxacum officinale</i> Webb (Asteraceae) SB063 NB016; NB048	Рарădie; кульбаба (kulbaba)	Flowers	Jam	1	
		Aerial parts	Salad		3
		Roots	Salad		2
			Coffee		2***
			Tea		1
<i>Thymus</i> sp. pl. including <i>T. vulgaris</i> L. and <i>T. serpyllum</i> L. (Lamiaceae) SB001; SB090 NB027; NB125; NB030	Чабер; чебрець; чебрик; городній чебрець (Chaber; chebrets; chebryk; horodnii chebrets) <i>Thymus vulgaris</i> : Cimbru; Cimbru sălbatic; чеберецьсадовый (cheberets sadovy) <i>Thymus serpyllum</i> : Cimbrișor; чебрек польовий; чебрець звичайний, чебрик польовий; польовий чебрець (chebrek polovy; chebrets zvychainyi, chebryk polovy; polovy chebrets)	Aerial parts	Tea	4	8
			Seasoning	16	8
<i>Tilia cordata</i> Mill. (Malvaceae) SB017 NB253	Теї; липа (Lyra)	Flowers	Tea	2	12
<i>Tussilago farfara</i> L. (Asteraceae) SB065; SB085 NB072; NB133	Podbal; мати й мачуха (Maty y machukha)	Leaves	Sarmale	5	
		Aerial parts	Tea		2
<i>Urtica dioica</i> L. (Urticaceae) SB088, NB026; NB048	Urzică; кропива (Kropyva)	Aerial parts (young)	Soup	17	
			Borsh	4	25
			Stewed (with cream)	2	
			Salad		1
			Seasoning		1

<i>Vaccinium myrtillus</i> L. (Ericaceae) SB006 NB060	Афіна; афини; афинник (Афуну; афунник)	Aerial parts	Strong alcohol (<i>afinata</i>)	6	
			Tea	9	7
		Fruits	Juice	5	2
			Syrup	3	3
			Frozen	1	2
			Preserved in <i>rachiu</i>	1	
			Raw (with sugar)	2	1
			Compote	4	4
			Jam	17	18
			Cake	1	
			Preserved with sugar	1	
			“Wine”	1	1
			Dessert		3
			Dried		1
Snack		1			
<i>Vaccinium vitis-idaea</i> L. (Ericaceae) SB010 NB061	Меришоаре; гогодзи§; гогдзи§; брусніка (Gogodzy§; hohdzi§; brusnika)	Fruits	Raw	4	
			Jam	7	9
			Juice	8	1
			Drink	1	
			Compote	2	1
			Syrup		2
			Frozen		1
			Snack		1
			Tea		3
			Kvas		1
<i>Viburnum opulus</i> L. (Adoxaceae) NB223	Călină; калина (Kalyna)	Fruits	Strong alcohol (<i>Calinata</i>)	4	
			Preserved in jars	2	
			Syrup	2	
		Aerial parts	Tea		3

Twenty-six taxa were found on both sides of the border, 8 taxa were reported only in Romania and 13 only in Ukraine (Figure 4). When considering only the plants mentioned by at least 10% of the interviewees (3), Romanian Hutsuls mentioned 10 taxa, Ukrainians 5 taxa and 16 were common to both. The Jaccard Similarity Index (JI) for the two groups was 55 when based on all the taxa, while an index value of 51 was observed when considering only the taxa mentioned by 10% of interviewees. The most common taxa correspond to those most used overall (*Vaccinium myrtillus*, *Rubus idaeus* and *Urtica dioica*), although among Romanian Hutsuls *Fagus sylvatica* was also very common as its wood was used for smoking pork meat, which is one of the most traditional Hutsul preparations, as well as to flavour soups. *Rumex acetosa* was very often reported by Ukrainian Hutsuls (but never by Romanian Hutsuls) as an ingredient for soups. The most common food purpose was recreational tea, a preparation used for 30 taxa. Tea was widely reported in Northern Bukovina where 23 taxa were mentioned, of which 13 were shared with Southern Bukovina, for a total of 81 DUR.

In addition, 6 taxa were reported only among Hutsuls in Southern Bukovina for a total of 19 taxa and 65 DUR. In line with Sõukand et al. [28], the main represented families for recreational teas were Rosaceae followed by Asteraceae and Lamiaceae. Another common preparation was jam which predominated in Romania (82 DUR) and included 8 taxa, 5 of which were common to both communities (*Fragaria vesca*; *Rubus caesius*; *Rubus idaeus*; *Vaccinium myrtillus*; *Vaccinium vitis-idaea*). Among the taxa used for jams exclusively prepared by Romanian Hutsuls, we found the young sprouts of *Picea abies*, which are harvested in June and can also be used for making medicinal syrup, and the petals of *Rosa rugosa* and *Rosa centifolia*, which are used for jams and teas almost exclusively by Romanian Hutsuls. In addition, the flowers of *Taraxacum officinale* were also used for the preparation of jam in Southern Bukovina. Another common use of wild food plants was seasoning, and in particular *Thymus* sp. pl. and *Armoracia rusticana* which were used in both communities. Actually, *Armoracia rusticana* was reported by Ukrainian Hutsuls for “квашення” (kvashennya), which is a lacto-fermented preparation of cucumbers, tomatoes, cabbage or other vegetables, a typical recipe common in Romania under the name of “muraturi”. For this preparation, Hutsuls from both communities reported the use of *Armoracia rusticana* roots (in Ukraine leaves were also reported) and *Quercus* sp. pl. (young branches in Romania and leaves in Ukraine), and *Carum carvi* only in Ukraine. Many other cultivated plants (cucumbers, carrots, garlic, cabbage, cauliflower, as well as mushrooms in some cases) were added to this preparation, which is later fermented. Another peculiar mode of preparation reported in Ukraine is “Кеас (kvas)”, a drink made from fermented grain and low in alcohol content. Birch sap was also reported as an ingredient for kvas. Such a drink is often flavoured with berries and fruits, including *Aronia melanocarpa*, *Sorbus* sp. pl. and *Vaccinium vitis-idaea* which were mentioned by interviewees.

On both sides of the border, berries were often prepared as compote, which is made by boiling fruits (in this case *Fragaria vesca*, *Rubus idaeus*, *Rubus caesius*, *Vaccinium myrtillus*, *Vaccinium vitis-idaea*) in abundant water and later removing them to drink the flavoured liquid. Berries are either eaten as a dessert or thrown away. The compote can be prepared with or without adding sugar (e.g. *Vaccinium myrtillus* compote). Compote was often reported as a preserve for winter time.

Freezing as a conservation method was mentioned only by one person in Romania (for *Vaccinium myrtillus*), while it was more often reported in Ukraine for other berries (*Rubus idaeus*, *Fragaria vesca* and *Vaccinium vitis-idaea*).

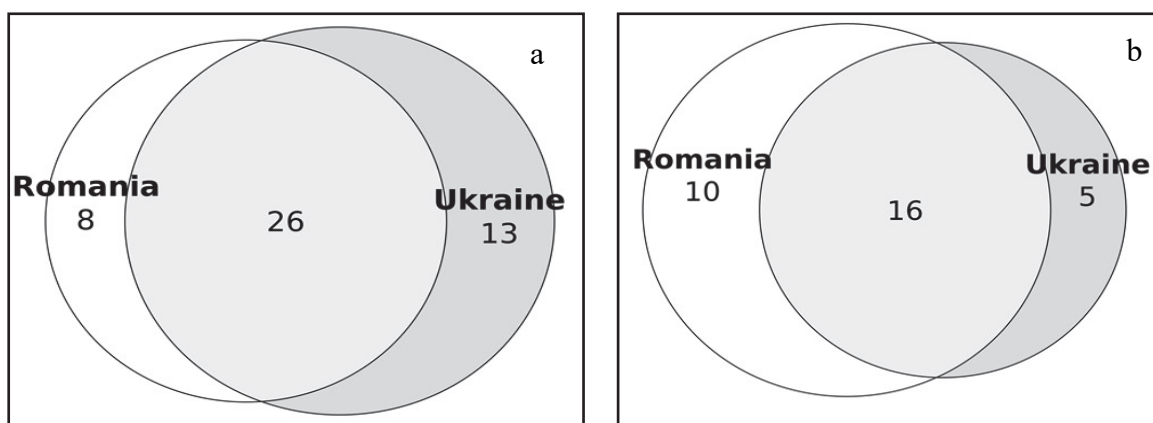


Figure 4a. The proportional Venn diagram shows that most of the food taxa mentioned are common to Hutsul communities of Northern and Southern Bukovina; $JI = 55$.

Figure 4b. The proportional Venn diagram of food taxa mentioned by at least three interviewees shows that Romanian Hutsuls reported more consistent uses than Ukrainian Hutsuls. Indeed, several food taxa were mentioned by only one or two Ukrainian Hutsuls; $JI = 51$.

Medicinal taxa

We recorded 111 plant taxa used for medicinal purposes (Table 2).

Table 2. Recorded medicinal taxa in Northern and Southern Bukovina.

Legend: * denotes recently adopted; *** denotes in the past. Plant names mentioned by Ukrainian Hutsuls are reported in Cyrillic (with transliteration). Plant names mentioned by Romanian Hutsuls are reported in the Latin alphabet. Plant names not reported in Romanian or Ukrainian dictionaries or in previous publications (e.g. Pieroni and Söukand, 2017), and are therefore probably Hutsul names, are marked with a §. A Russian name is marked with a ^.

Latin name, Family and Voucher specimens	Local names	Used part(s)	Preparation	Medicinal Use	DUR	
					RO	UA
<i>Abies alba</i> Mill. possibly including <i>Picea abies</i> (L.) H. Karst. (Pinaceae)	Молід; ялина (Yalyna)	Resin	Locally Applied	Joint pain		2
		Young sprouts	Syrup (fresh)	Fever	1	
				Cough	2	
			Good for lungs	5		
<i>Achillea carpatica</i> Blocki ex Dubovik (Asteraceae)	Деревій карпатський (Derevii karpatskyi)	Aerial parts	Tea (dried)	Digestive system problems		1
				Stomach diseases		1
<i>Achillea millefolium</i> L. (Asteraceae) SB011; SB074; SB050 NB007; NB017; NB039	Coadă șoaricelului; деревій; деревій, тисячолітник; деревій звичайний; деревій буковинський (Derevii; derevii, tysiacholitnyk; derevii	Aerial parts	Tea	Vessel cleansing		1
			Locally applied (juice of pressed leaves)	Wounds		3
			Tea	Diarrhoea		3

	zvychainyi; derevii bukovynskyi)			Digestive system problems		1			
				Good for the liver	1				
				Good for the stomach	2	5			
				Vomiting		1			
				Disinfectant	4				
				Tea with Chelidonium	Disinfectant	4			
				Tea	Hair care	4			
					Pain		1		
					Panacea		1		
					Aching legs		1		
					Calming		2		
					Toothache		3		
		Cold	2						
<i>Acorus calamus</i> L. (Acoraceae) NB121	Aip (Air)	Roots	Tea	Diarrhoea		1			
				Good for the stomach		1			
<i>Aesculus hippocastanum</i> L. (Sapindaceae) SB057 NB067	Castan; каштан; каштан кінський червоний; каштан чеворний (Kashtan; kashtan kinskyi chervonyi; kashtan chevornyi)	Flowers	Locally applied (in alcohol/moonshine)	Feet pain		1			
				Joint pain	1	7			
		Fruits	Infused in alcohol	Good for blood vessels		1			
				Locally applied (in alcohol/moonshine)	Foot pain		1		
				Joint pain		5			
<i>Alchemilla vulgaris</i> auct. (coll.) (Rosaceae) SB039	Crețisoara; Гарник (Harnyk)	Aerial parts	Locally applied (infused in alcohol)	Joint pain	1	2			
<i>Allium cepa</i> L. (Amaryllidaceae)	Сeară; цибулька; цибуля (Tsybulka; tsybulia)	Bulbs	Raw	Blood pressure		1			
				Iron		1			
				Flu		2			
			Tea	Fever	1				
				Cough	2				
				Good for the lungs	1				
			Boiled	Cough	1	3			
			Raw (with honey and sugar)	Cough	1				
			External shell	Fomentation	Women's problems		1		
<i>Allium sativum</i> L. (Amaryllidaceae) NB192	Usturoi; часник (Chasnyk)	Bulbs	Raw	Blood cleansing		1			
				Cancer		1			

				Immune boosting		1
				Vitamins		1
			Raw	Flu		2
			Locally applied	Earache	2	
			Crushed and locally applied with massage	Flu		2
<i>Alnus glutinosa</i> (L.) Gaertn. (Betulaceae) NB050; NB052	Дубило§; вільха (Dubylo§; vilkha)	Bark	Boiled	Gangrene		2
<i>Aloe vera</i> (L.) Burm.f. (Xanthorrhoeaceae)	Алое (Aloe)	Leaves	Locally applied	Wounds		3
			Raw	Abscesses		1
<i>Anethum graveolens</i> L. (Apiaceae) SB032	Кріп (Krip)	Aerial parts, seeds	Tea	Panacea		1
		Leaves	Raw	Vitamins		1
		Seeds	Tea	Blood pressure		2
				Good for the stomach		2
				Fever		2
		Dried	To increase milk production in women		3	
<i>Arctium lappa</i> L. (Asteraceae) SB052; SB091 NB149	Brusturi; Brusturoi; лопух; рипях; лопух; рипяка (Lopukh; rypiakh; rypiaka)	Flowers	Boiled	Hair care		2
		Leaves	Locally applied (fresh and crushed)	Joint pain	3	3
			Raw	Headache		2
		Roots	Boiled	Hair care		9
<i>Armoracia rusticana</i> P.Gaertn., B.Mey. & Scherb. (Brassicaceae) SB031 NB028; NB212	Нреан; хрін; хреню (Khrin; khreniu)	Leaves	Locally applied on the head (fresh)	Fever	1	
			Locally applied	Joint pain		1
		Roots	Raw (in food)	Help the bloodstream	1	
				Healthy	1	
			Locally applied	Joint pain		1
				Rheumatic pains		1
Raw (in food)	Opening airways	1				
<i>Arnica montana</i> L. (Asteraceae)	Арніца; Arnica; Harnic; арніка (Arnica)	Flowers	Tea	Good for the heart		4
				Good for the eyes		1

			Locally applied (infused in alcohol)	Heart diseases		1
				Aching legs		2
				Back pain	1	
				Foot pain	2	
				Hand pain	2	
				Joint pain	4	8
				Rheumatic pains	5	1
				Wrist pain	1	
			Locally applied with (olive) oil	Hand pain	2	
				Joint pain		2
			Infused in alcohol (fresh)	Panacea	1 ***	
				Good for the skin	1 ***	
			Bath (fresh/dried)	Foot pain	1	
<i>Aronia melanocarpa</i> (Michx.) Elliott (Rosaceae)	горобина чорна; шкорух§; чорна горобина; рябина (Horobyna chorna; shkorukh§; chorna; horobyna; riabyna)	Fruits	Tea	Blood pressure		7
			Syrup	Blood pressure		1
<i>Artemisia absinthium</i> L. (Asteraceae) SB005 NB051	Pelin; полинь; полин (Polyn; polyn)	Aerial parts	Tea	Diarrhoea		1
				Good for the stomach	1	
				Stomach pain		1
			Tincture with alcohol	Appetite stimulant	2	
			Tea	Panacea		1
				Cancer		1 *
		Seeds	Tea	Diarrhoea		1
<i>Atropa belladonna</i> L. (Solanaceae)	Матриган § (Matrygan)	Roots	Infused in alcohol /moonshine	Reproductive potency		1
				Cancer		1
				Good for women		1
				Joint pain		3
<i>Avena sativa</i> L. (Poaceae) NB202	Овес (Oves)	Seeds	Tea	Healthy		2
				Kidney stones		2
<i>Bellis perennis</i> L. (Asteraceae)	Маргаритки (Marharytky)	Flowers	Raw	Good for the heart		2
<i>Beta vulgaris</i> L. (Amaranthaceae) SB026	Sfeclă; буряк червоний (Buriak chervonyi)	Tubers	Any preparation	Anaemia	2	
			Juice	Blood cleansing		2
				Good for haemoglobin		2
				Healthy	1	

				Joint pain		2
				Headache		2
				Cough	1	2
				Good for the throat		2
<i>Betula pendula</i> Roth (Betulaceae) SB087 NB041; NB115	Mesteacăn; береза (Bereza)	Bark	Boiled	Gangrene		2
		Buds and leaves	Tea	Blood cleansing		1 ***
		Flowers	Tea	Good for kidneys		2
		Leaves	Boiled	Hair care		2
			Tea	Healthy		1
		Sap	Drink	Good for the heart	1	
				Vascular problems	1	
				Good for the stomach	1	
				Healthy	2	
				Good for the kidneys	2	1
Good for the lungs	6					
	Lung cleansing	4				
Young leaves	Compress	Joint pain		1		
<i>Bidens tripartita</i> L. (Asteraceae) NB090	Черёда (Chereda)	Aerial parts	Tea for bathing kids	Good for the skin		1
<i>Brassica oleracea</i> L. (Brassicaceae)	Varză; капуста (Kapusta)	Leaves	Fermented juice	Good for cholesterol		2
				Good for pancreas		2
				Good for the stomach		1
			Locally applied (fresh)	Frostbite	1	
			Poultice applied on the back	Fever	1	
		Locally applied (fresh)	Fracture	1		
			Joint pain		2	
	Headache	1	2			
<i>Bryophyllum pinnatum</i> (Lam.) Oken (Crassulaceae)	Каланхое (Kalancoe)	Sap	Drink	Rhinitis		2
<i>Calendula officinalis</i> L. (Asteraceae) NB233	Gălbenele; нагідки, крокіс; крокіс; календула; нагідки (Nahidky, krokisy ; krokis; kalendula; nahidky)	Flowers	Tea	Blood pressure		1
				Skin cleansing	1	
				Good for the liver	3	2

				Good for the stomach	2	
				100 diseases		2
				Immune boosting		2
				Inflammation processes		1
				Good for women		2
				Women's problems		2
				Good for the kidneys		2
				Cough		1 ***
				Sore throat		1 ***
				Stomatitis (kids)		1 ***
			Boiled with fat and locally applied	Good for the skin	1	
				Warts	1	
				Fever	1	
			Syrup	Cough	1	
<i>Callisia fragrans</i> (Lindl.) Woodson (Commelinaceae)	золотий ус (zoloty us)	Leaves	Tea	Blood cleansing		1*
<i>Cannabis sativa</i> L. (Cannabaceae)	Сâneră	Leaves	Burnt	Ear pain	1	
<i>Capsella bursa-pastoris</i> L. (Brassicaceae) NB218	Грицики (Hrytsyky)	Aerial parts	Tea	Blood pressure		1
				Women's problems		1
				Headache		1
<i>Carum carvi</i> L. (Apiaceae) SB007 NB037	Săcărică; Secărică; Chimen; Hmel; Chimion; хміль§ (Khmil)	Aerial parts	Tea	Colds	3	
				Diarrhoea	5	2
				Good for the abdomen	2	
				100 diseases		2
				Healthy		2
				Strengthening of the organism	1	
				Cough	1	
				Good for the throat	1	
			Infused in alcohol	Hair care		1

		Seeds	Tea	Good for the stomach	5	5
<i>Centaureum erythraea</i> Rafn (Gentianaceae)	Центорія (Tsentoriia)	Aerial parts	Tea	Good for the heart		2
<i>Chelidonium majus</i> L. (Papaveraceae) SB003 NB154;NB078	Rostopască; чистотіл (Chystotil)	Aerial parts	Tea	Good for the digestive system	1	
				Good for the liver	2	
				Good for the stomach	2	
				Liver diseases	2	
				Organism cleansing	4	
				Stomach disinfection	4 *	
		Locally applied (infused in alcohol)		Joint pain		1
	Tincture with vinegar	Joint pain		1 ***		
	Sap	Locally applied (fresh)	Blisters	1		
<i>Chenopodium album</i> L. (Amaranthaceae) NB139	Натинаş, лебеда (Natynaş;lebeda)	Aerial parts	Any Preparation	Healthy		1
<i>Cichorium intybus</i> L. (Asteraceae) SB046	петрові батогі; петрів батіг (Petrovi bathy; petriv bathih)	Aerial parts	Tea	Diarrhoea		1
				Good for the digestive system		1
				Good for the liver		1
<i>Coriandrum sativum</i> L. (Apiaceae)	коляндра; колендра (Koliandra; koliendra)	Seeds	Tea	Fever		7
<i>Corylus avellana</i> L. (Betulaceae) SB089	Alune	Leaves	Tea	Prostatitis	2	
<i>Crataegus</i> sp. pl. including <i>C. monogyna</i> Jacq. (Rosaceae) SB064 NB066, NB234	Păducel; бояришнік; глід (Boiaryshnik^; hlid)	Flowers	Tincture with alcohol	Good for the heart		3
			Infused in moonshine/alcohol	Good for the heart		2
				Good for blood vessels		1
		Fruits	Tea	Blood pressure	1	2
				Good for cholesterol	1	

				Good for the heart	1	2
				Good for blood vessels		1
				Calming		1
				Soporific		1
			Dried	Good for the heart		1
			Tincture with alcohol	Good for the heart		3
<i>Cyanus segetum</i> Hill. (Asteraceae)	Centaurea; васильки (Vasylyky)	Flowers	Tea	Panacea		1
		Aerial parts	Tea	Good for the liver	2	
<i>Daucus carota</i> L. (Apiaceae) SB027	Morcov	Roots	Raw	Improve vision	1	
<i>Dryopteris filix-mas</i> (L.) Schott (Dryopteridaceae) NB193	Лісова папороть; солодка папороть (Lisova paporot; solodka paporot)	Aerial parts	Boiled	Good for the heart		3
			Tea	Good for the heart		3
<i>Elaeagnus rhamnoides</i> (L.) A. Nelson (Elaeagnaceae)	Обліпиха (Oblipykha)	Fruits	Oil	Burns		1
				Wounds		1
			Raw with sugar	Healthy		1
			Boiled with sheep fat	Women's problems		1
<i>Epilobium angustifolium</i> L. (Onagraceae) NB057	іван чай, демник§, димник§ (ivan chai, demnyk§, dymnyk§)	Flowers	Tea	Healthy		2
				Good for the intestines		1*
				Healthy		1*
<i>Equisetum arvense</i> L. (Equisetaceae) SB020 NB113; NB114	Соода calului; падиволос (хвощ) (padyvolos (khvoshch))	Aerial parts	Tea	Good for the abdomen	1	
				Liver diseases		1
				Good for the kidneys	1	
				Good for the urinary tract	4	
				Good for the lungs	2	
		Flowers	Infusion at 70°C	Headache	1	
<i>Fragaria vesca</i> L. (Rosaceae) SB094 NB004; NB015; NB071; NB240	Fragi; ягоди, лісова ягода; ягоди лісові; суниці лісові наз земляніка (yahody; lisova yahoda; yahody lisovi; sunytsi lisovi naz zemlianika)	Aerial parts	Tea	Good for the heart	4	
				Healthy		1
		Flowers	Dried	Blood pressure		2
				Tea	Good for the kidneys	
			Dried	Vitamins		3
			Dried	Diarrhoea		2

		Fruits	Raw	100 diseases		2
				Fever		1
				Healthy		1
				Good for the skin		2
<i>Frangula alnus</i> Mill. (Rhamnaceae)	Крушина (Krushyna)	Bark	Boiled	Jaundice		1
<i>Galium verum</i> L. (Rubiaceae) SB093	Sânziana	Aerial parts	Locally applied	Women's problems	1*	
			Tea	Women's problems	1*	
<i>Gentiana lutea</i> L. (Gentianaceae)	Gingiura; Джинджора (Dzhyndzhora)	Roots	Infused in alcohol	Good for the liver		1
				Good for the stomach	1	
<i>Ginkgo biloba</i> L. (Ginkgoaceae)	Гінго білоба (Hinho biloba)	Leaves	Infused in moonshine	Blood cleansing		1*
<i>Helianthus annuus</i> L. (Asteraceae)	Соняшник (Soniashnyk)	Fruits	Oil	Constipation		1
<i>Helichrysum arenarium</i> (L.) Moench (Asteraceae) NB258	Цмин пісковий (Tsmyn piskovy)	Aerial parts	Tea (dried)	Good for the digestive system		1
				Stomach diseases		1
<i>Hypericum</i> sp. pl. including <i>H. perforatum</i> L. and <i>H. tetrapterum</i> Fr (Hypericaceae) SB068 NB080NB101; NB108; NB116	Рojärniță; Sunătoarea; звіробой; звіробій (Zviroboi; zvirobii)	Aerial parts	Tea	Blood pressure		2
				Blood cleansing		1***
				Diarrhoea		3
				Good for the liver	7	
				Good for the stomach	8	3
				Good for the gallbladder	1*	
				100 diseases		1
				Disinfectant	1	
				Healthy	1	4
				Panacea		1
				Women's problems		2
				Calming	1	
				Good for the eyes	2	
				Drink		1***
			Locally applied (infused in oil)	Burns	4	1
Wounds	4					

			Locally applied (in spirits with oil)	Good for the liver	2		
				Good for the stomach	2		
<i>Juglans regia</i> L. (Juglandaceae) SB051 NB210	Nuc; gorix (Horikh)	Flowers	Tea	Blood pressure		1	
		Fruits	Dried	Healthy		3	
				To increase milk production in women		2	
			Raw	To increase milk production in women		3	
					“Jod”		1
		Inner woody part of the fruit	Infused in alcohol	Good for the thyroid		1	
		Leaves	Tea	Good for the heart		1	
				Hair care	1	1 ***	
Unripe fruits	Infused in alcohol	Good for the thyroid		1			
<i>Juniperus communis</i> L. (Cupressaceae) SB086	Ienupăr; жуніпера (zhunipera)	Fruits	Tea	Good for the liver	1		
		Leaves	Tea	Good for the kidneys		2	
<i>Lamium album</i> L. (Lamiaceae) NB216	Кропива собача; біла кропива нежалка; глуха кропива (Кропува sobacha; bila kropsuva nezhalka; hlukha kropsuva)	Aerial parts	Tea	Blood pressure		1	
				Good for the heart		3	
				Nerves		1	
<i>Leonurus cardiaca</i> L. (Lamiaceae) SB013	Талпа găștei; пустирник (Pustyrnyk)	Aerial parts	Tea	Blood pressure		1	
				Good for the heart	6	1	
				Healthy	2		
				Pain	1		
				Nerves	2		
		Rhinitis	4				
		Leaves	Locally applied (fresh with pork fat)	Cuts	2		
Warts	2						
<i>Levisticum officinale</i> W.D.J.Koch (Apiaceae)	Любисток (Liubystok)	Aerial parts	Tea	Alcoholism		1	
				Hair care		3	
<i>Lilium candidum</i> L. (Amaryllidaceae)	Crin alb; Narcise; лілія біла; лилия	Flowers	Locally applied	Good for veins	1		

SB049	(Liliia bila; lylyia)		(infused in alcohol)	Bee stings		1
				Burns		1
				Warts		5
			Locally applied (infused in alcohol)	Wounds		6
			Locally applied (in spirits, medicinal)	Joint pain	1	
				Tired feet	1	
			Drink (infused in alcohol)	Healthy		1
<i>Linum usitatissimum</i> L. (Linaceae)	Лин; лен; льон (Len; lon)	Seeds	Tea	Good for the stomach	1	2 ***
				To increase milk production in women		3
<i>Lonicera caprifolium</i> L. (Caprifoliaceae)	Floarea maicii domnului	Aerial parts	Locally applied (dried tea)	Wounds	1	
				Women's problems	1	
				Measles	1	
<i>Lycopodium clavatum</i> L. (Lycopodiaceae) NB231	Плаун (Plaun)	Aerial parts	Dried	Wounds		2
<i>Maclura pomifera</i> (Raf.) C.K.Schneid. (Moraceae)	Адамове яблуко матлюрка (Adamove yabluko matliurka)	Fruits	Locally applied (infused in alcohol)	Women's problems		2
				Joint pain		2
<i>Malus domestica</i> Borkh. (Rosaceae) NB242	Яблука (Yabluka)	Fruits	Boiled with onion	Cough		3
<i>Matricaria chamomilla</i> L. (Asteraceae) SB019; SB022 NB164; NB171	Mușețel; Romaniță; ромашка; румянец (Romashka; rumianets)	Aerial parts	Tea (dried)	Red skin		1
				Good for the digestive system		1
				Inflammation processes		1
				Good for the throat		1
		Flowers	Poultice (dried)	Evil eye	1	
			Compress	Skin infections	1	
				Warts	1	
				Eye cleaning	2	
				Eye problems	1	3
				Good for the eyes	1	2
Tea	Diarrhoea	1				

				Good for the stomach	2	3
				Disinfectant	1	
				Healthy	1	3
				Panacea	1	5
				Good for the urinary tract	2	
				Headache	2	
				Wound cleansing		1 ***
				Gum problems	1	
				Colds	2	1 ***
			Tea with O. Vulgare	Gum problems	1	
				Disinfectant	1	
<i>Melissa officinalis</i> L. (Lamiaceae)	Меліса (Melisa)	Leaves	Tea (dried)	Healthy		2
				Pain		2
				Calming		3
				Headache		1
				Soporific		1
				Stress		1
<i>Mentha</i> sp.pl. (Lamiaceae) SB014; SB016; SB034; SB096 NB079;NB080;NB097	Ментā; мята; мятка; мята гладка; мята кучерява; мятка кінська; мятка перчева (Miata; miatka; miata hladka; miata kucheriava; miatka kinska; miatka percheva)	Aerial parts	Tea	Good for the heart		6
				Heart disease		1
				Diarrhoea	1	
				Good for the stomach		1
				Stomach problems		2
				Vomiting		1
				Healthy	1	
				Pain		1
				Diuretic	1	
				Good for the urinary tract	2	
				Calming	1	1
				Headache		2
				Stress		1
			Locally applied (infused in alcohol)	Joint pain		1
<i>Origanum vulgare</i> L. (Lamiaceae) SB036 NB033; NB055; NB021	Şovârv; Şovârf; Materanca bila; материнка (Materynka)	Aerial parts	Tea	Blood pressure	4	
				Blood regeneration		1

				Good for the heart	4	2
				Red skin		2
				Abdominal pain	2	
				Diarrhoea		1
				Good for the liver	3	
				Good for the stomach	7	2
				100 diseases		2
				Disinfectant	1	
				Fever	1	
				Healthy		2
				Inflammation processes		2
				Panacea		1
				Leptospirosis	1	
				Septicaemia	1	
				Good for the kidneys	1	
				Soporific		1 ***
				Good for the lungs		1
		Aerial parts (flowers)	Tea	Women's problems		8
<i>Panax ginseng</i> C.A. Mey. (Araliaceae)	Женшень (Zhenshen)	Roots	Infused in alcohol	Blood pressure		1
<i>Papaver somniferum</i> L. (Papaveraceae)	Мак (Мак)	Aerial parts	Tea	Soporific		2 ***
<i>Petroselinum crispum</i> (Mill.) Fuss (Apiaceae) NB220	Петрушка (Petrushka)	Leaves	Raw	Vitamins		2
<i>Phaseolus vulgaris</i> L. (Fabaceae)	Фасоля (Fasolia)	Pod	Tea	Diabetes		2
<i>Picea abies</i> (L.) H. Karst. possibly including <i>Abies alba</i> Mill. (Pinaceae) SB008 NB043	Врад; смерека; хвоя (Smereka, khvoya)	Flowers	Syrup	Bronchitis		2
				Cough		4
				Good for breathing		2
		Needles	Syrup	Cough		2
				Cough		2
		Tea	Good for the throat		2	
			Resin	Locally applied	Joint pain	
		Sprouts (young)	Syrup	Fever	1	
				Panacea	2	
				Colds	4	
Cough	8					

				Good for the lungs	2	
				Good for the respiratory system	2	
				Good for the throat	1	
				Bronchitis		2
				Sore throat	1	
			Essence (fresh)	Panacea	2	
				Colds	2	
		Young cones	Syrup	Bronchitis		2
				Cough		4
			With sugar	Pneumonia		1
<i>Pinus sylvestris</i> L. (Pinaceae)	Pin	Young sprouts	Syrup (fresh)	Cough	1	
<i>Plantago lanceolata</i> L. (Plantaginaceae) SB037	Pătlagină îngustă; подорожник ланцеолистий (Podorozhnyk lantseolystyi)	Leaves	Tea (fresh)	Cough	1	1
<i>Plantago major</i> L. (Plantaginaceae) SB066 NB022;NB047; NB132	Platagine; Platagină; Podorojnic; подорожник (Podorozhnyk)	Leaves	Locally applied (fresh)	Abscesses		2
				Cuts	1	1
				Good for the skin	2	
				Pus	1	
				Skin infections	1	
				Skin irritation	1	
				Disinfectant		1* **
				Sores	1	
				Warts	3	3
				Wounds	1	15
			Locally applied (with alcohol)	Wounds		2
			Tea	Cough		2
		Seeds	Tea	Good for the kidneys		2
		Whole plant	Tea	Women's problems		1
<i>Potentilla anserina</i> L. (Rosaceae)	Coadă racului	Aerial parts	Tea	Indigestion	1	
<i>Potentilla erecta</i> (L.) Raeusch. (Rosaceae)	Калган; калган; перстач прямостоячий (Kalhan; kalhan; perstach priamostoiachyi)	Roots	Tea	Reproductive potency		1
			Tea (dried)	Reproductive potency		1
			Infused in alcohol	Good for men		1
				Joint pain		2

				Good for the thyroid		1
<i>Primula</i> sp.pl. including <i>P. veris</i> L. and <i>P. elatior</i> (L.) Hill (Primulaceae)	Ciobața cucului; Ciobața cucului; первоцвіт буковинський (Pervotsvit bukovynskyi)	Aerial parts	Tea	Good for the heart	1	
				Good for the liver	1	
		Flowers	Tea	Good for the stomach		2
<i>Prunus avium</i> (L.) L. (Rosaceae) SB059	Cireș	Stalks	Tea	Cough		3
				Diuretic	1	
				Good for the kidneys	1	
<i>Pteridium aquilinum</i> (L.) Kuhn (Dennstaedtiaceae) NB074	Папороть орляк (Paporot orliak)	Aerial parts	Bath	Women's problems		1
<i>Pyrus pyraster</i> (L.) Burgsd. (Rosaceae)	Дика груша (Dyka hrusha)	Fruits	Tea	Salt in the joints		2
			Infused in spirits	Salt in the joints		2
<i>Quercus</i> sp. pl. including <i>Q. robur</i> L. and <i>Q. rubra</i> L.	Дуб (Dub)	Bark	Boiled	Gangrene		2
			Tea	Toothache		1
<i>Raphanus sativus</i> L. (Brassicaceae) NB250	Редька чорна (Redka chorna)	Roots	Baked	Cough		2
				Good for breathing		2
<i>Ribes nigrum</i> L. (Grossulariaceae) SB042 NB211	Соacăză neagră ; смородина; чорна смородина (Smorodyna; chorna smorodyna)	Aerial parts	Tea	Cough		2
			Fruits	Juice	Blood pressure	
		Jam		Good for haemoglobin		1
		Jam		Good for the eyes		1
		Raw		Blood pressure		3
			Good for the intestines	2		
Vitamins	2					
<i>Ribes rubrum</i> L. (Grossulariaceae) SB042 NB213	Соacăză rosu; яверниця; пожички; червона смородина (Yavernytsiș, pozhychkyș, chervona smorodyna)	Fruits	Raw	Good for the intestines	2	
				Vitamins	2	
				Kidneys stones		2
		Tea	Fever		1	
			Flu		1	
<i>Rosa canina</i> L. (Rosaceae) SB062 NB018; NB083	Мăceșe; Măceș de padure; шипшина (Shypshyna)	Fruits	Tea	Good for the heart	1	
				Good for the kidneys		2
				Healthy		2
				Immune boosting		1

				Vitamins		1
				Good for the kidneys		1
				Good for the urinary tract	2	
				Cough	4	
				Flu	4	
				Syrup (fresh)	Cold	1
	Roots	Tea	Good for the kidneys		3	
<i>Rosa rugosa</i> L. and <i>Rosa centifolia</i> L. (Rosaceae) SB023	Trandafir; роза (Roza)	Flowers	Tea	Calming		1
		Petals	Juice	Foot-and-mouth disease	1	
<i>Rubus caesius</i> L. (Rosaceae) NB062; NB063	Ожина; чониця; ежевіка; ожина (Ozhyna; chonytsia; yezhevika; ozhyna)	Fruits	Infused in alcohol	101 diseases		2
			Boiled	Healthy		1
			Raw (with sugar)	Cancer		1
				Vitamins		5
				Colds		1
				Flu		1
<i>Rubus idaeus</i> L. (Rosaceae) SB071; SB009 NB081	Zmeurã; малина (malyna)	Aerial parts	Tea	Diabetes	1	
				Diabetes		1
				Fever	3	6
				Healthy		3
				Good for the kidneys		1
				Colds	2	3
				Cough		3
				Flu		1
				Fruits	Tea	Blood pressure
		Jam	Good for haemoglobin			1
		Dried	Fever			3
		Juice	Fever			6
			Colds		1	
			Cough		1	
		Juice with lemon	Fever		1	
		Locally applied syrup without sugar	Fever		1	1
		Moonshine	Healthy			1*
			Syrup (without sugar, with mashed potatoes)		Fever	1
		Colds		1		

			Raw (with sugar)	Panacea		1
				Flu		1
				Vitamins		5
				Colds	2	1
				100 diseases		2
			Syrup (fresh)	Cough	1	
				Flu	4	1
				Colds	1	
				Fever	5	
				Strengthening of the organism	1	
				Good for the lungs	1	
<i>Rumex acetosa</i> L. (Polygonaceae) NB081	М'ясиґ; квасґ; квасокґ; щавель (Kvasґ; kvasokґ; shchavel)	Aerial parts	Any preparation	Vitamins		3
		Roots	Tea	Good for the liver	1	
				Colds	2	
<i>Rumex alpinus</i> L. (Polygonaceae) SB067	Ғtevie	Leaves	Locally applied (fresh)	Cuts	2	
			Tea	Diarrhoea	1	
<i>Salix x fragilis</i> L. (Salicaceae)	Верба ламка (Verba lamka)	Bark	Tea	Fever		1
<i>Salvia pratensis</i> L. (Lamiaceae) SB028	Salvia	Aerial parts	Tea	Calming	1	
<i>Sambucus nigra</i> L. (Adoxaceae) SB084 NB054	Сос; бузина (Бузина)	Flowers	Drink	Blood pressure	1	
				Good for the stomach	4	
				Good for the kidneys	4	
				Good for the urinary tract	4	
			Tea	Colds		1
				Cough		4
				Flu		2
				Good for the throat		2
			Infused in alcohol	Cough		1
		Leaves	Dried	Good for the heart		2
<i>Sedum roseum</i> (L.) Scop. (Crassulaceae)	Червона щітка (Chervona shchitka)	Roots	Tea	Good for the pancreas		1
				Immune boosting		1
<i>Solanum tuberosum</i> L. (Solanaceae)	Cartofi; бараболя; картошка (Barabolia; kartoshka)	Tubers	Locally applied (fresh)	Fever	1* **	3
				Headache	3	

			Boiled	Cough		3
<i>Sorbus domestica</i> L. (Rosaceae) SB055 NB232	Scoruș	Fruits	Tea (fresh/dried)	Blood sugar	4	
<i>Stellaria media</i> (L.) Vill. (Caryophyllaceae)	Мокриця; червець (Mokrytsia; chervets)	Aerial parts	Tea	Cough		2
<i>Symphytum officinale</i> L. (Boraginaceae) SB070 NB166; NB167; NB184; NB189	Tătăneasă; живокост; гауізь§; гауізь§ (Zhyvokost; hauiz§; hauiz§)	Roots	Locally Applied (boiled)	Good for the skin	1	
			Locally applied (fresh)	Fracture	1	1
				Gout		1
				Joint pain	1	3
				Rheumati c pains		1
		Hernia	1			
		Locally applied (infused in alcohol)	Joint pain	2		
			Good for the liver	2		
Locally applied (fresh with wax)	Joint pain		1			
Whole plant	Tea (fresh)	Good for the liver	2			
		Good for the stomach	2			
<i>Syringa vulgaris</i> L. (Oleaceae) NB208; NB209	Бузок (Busok)	Flowers	Infused with moonshine	Joint pain		1
			Tea	Bronchitis		1
				Cough		3
<i>Tagetes erecta</i> L. (Asteraceae)	Чорнобривці (Chornobryvtsi)	Flowers	Tea	Blood cleansing		1
				Abscesses		1
				Diabetes		1
				Good for the liver		1
<i>Tanacetum balsamita</i> L. (Asteraceae)	Canufar; Кануфер (Kanufer)	Aerial parts	Infused in alcohol	Abscesses		1
				Wounds	1* **	1
<i>Taraxacum officinale</i> Webb (Asteraceae) SB063 NB016; NB048	Ря́діє ; кульбаба (Kulbaba)	Aerial parts	Raw	Vitamins		2
		Flowers	Syrup (fresh)	Good for the liver	1	
			Jam	Good for the urinary tract	4	
<i>Thymus</i> sp. pl. including <i>T. serpyllum</i> L. and <i>T.</i> <i>vulgaris</i> L. (Lamiaceae) SB001; SB090 NB030; NB027; NB125; NB019	чабер; чебрець, чебрик; городній чебрець (Chaber; chebrets, chebryk; horodnii chebrets) <i>Thymus serpyllum</i> : Сімбриşor; чебрець звичайний, чебрик польовий; польовий	Aerial parts	Tea	Good for the stomach	1	2
				Lung diseases		1
				Good for the throat		1
				Good for the lungs	3	

	чебрець (chebrek polovyi; chebrets zvychainyi; chebryk polovyi; polovyi chebrets) Thymus vulgaris: Cimbru sălbatic; чеберець садовий (Cheberets sadovyi)			Colds	2			
				Pain	2			
				Panacea	3			
				Good for the kidneys	1			
				Syrup	Cough		3	
				Tea	Good for breathing		1*	**
					Cough	10	12	
					Good for veins	2		
					Alcoholism		1	
				Burnt three times	Evil Eye		1*	**
Flowers	Tea	Colds		1				
<i>Tilia cordata</i> Mill. (Malvaceae) SB017 NB253	Теї; липа (Лура)	Flowers	Tea (dried)	Good for the heart	4			
				Abdominal pain	1			
				Good for digestion	2			
				Good for the liver		2		
				Good for the stomach	7			
				Fever		2		
				Inflammation processes		1		
				Organism cleansing	1			
				Good for women	1			
				Good for the kidneys		2		
				Calming	6	1*	**	
				Headache	1			
				Headache	1	1		
				Soporific	2			
				Colds	2	1		
				Cough	3	1		
				Flu	1			
				Panacea		1*	**	
				Leaves	Boiled	Hair care		2
<i>Trifolium pannonicum</i> Jacq. (Fabaceae)	конюшина панойська з жовтими квітами (Koniushyna panoiska z zhovtymy kvitamy)	Flowers	Tea (dried)	Healthy		1		
<i>Trifolium</i> sp. pl. including <i>T. pratense</i> L. (Fabaceae) SB072; SB075; SB077; SB078	Trifoi alb; Trifoi rosu; тріфоль; конюшина червона (Trifol; koniushyna chervona)	Aerial parts	Tea (dried)	Good for the urinary tract	2			
				Headache	1	1		

NB002; NB013; NB014; NB076; NB086; NB102; NB103; NB110; NB111; NB112; NB119; NB123; NB126; NB134; NB140; NB144				Good for the lungs	4	
<i>Tussilago farfara</i> L. (Asteraceae) SB065; SB085 NB072; NB133	Podbal; підбіл;мати й мачуха; (Pidbil; maty u machukha)	Aerial parts	Tea	Cough	1	9
		Flowers	Syrup (fresh)	Cough	1	
			Tea	Colds		1
		Leaves	Locally applied (fresh)	warts	2	
		Roots	Syrup	Good for the throat		1
Whole plant	Boiled	Cough		1		
<i>Urtica dioica</i> L. (Urticaceae) SB088 NB026; NB048	Urzicǎ; кропива; кропива жалка (Кропува; кропува zhalka)	Young sprouts (aerial parts)	Boiled (in soup)	Blood cleansing	4	1
				Vessel cleansing		1
			Tea	Blood cleansing	9	3
				Blood pressure		1
				Good for the heart	1	2
				Good for the stomach		2
				Vomiting		2
				Rheumatic pains	2	
				Calming		2
				Toothache		2
				Nosebleeds		2
				Healthy	1	
			Organism cleansing	5		
			Boiled	Hair care	5	10
			Any preparation	Healthy		1
Panacea	2					
Vitamins	2	3				
Locally applied (fresh)	Rheumatic pains	4				
<i>Vaccinium myrtillus</i> L. (Ericaceae) SB006 NB060	Afina (fruits); Afiniş (aerial parts); афини; чорниця (fruits); аффинник (aerial parts) (Afyny; chornytsia; afynnyk)	Aerial parts	Tea	Blood cleansing	1	
				Blood pressure		2
				Good for the heart	1	
				Fever	1	
				Healthy	1	
To be strong		1				

			Lowering glycaemia	1	
			Good for the eyes		3
		Compress	Diabetes	2	
		Any preparation	Diabetes	6	1
			Good for the stomach	11	7
		Compress	Eye problems	2	1
	Aerial parts (including fruits)	Tea	Good for the kidneys	1	4
	Flowers	Dried	Good for the pancreas		1
			Good for the stomach		1
	Fruits	Raw (with sugar)	Good for the heart	2	
			Diabetes		1
			Diarrhoea		1
			Healthy	2	5
			Panacea	3	1
			Improve vision	2	
			Vitamins		2
			Good for the eyes		4
			Flu		1
		Jam	Flu		1
			Good for the eyes		2
			Good for haemoglobin		1
			Diarrhoea		1
		Juice	Diarrhoea	1	
			Good for the liver	1	
		Syrup	Abdominal pain	1	
			Good for the abdomen	1	
			Diarrhoea	1	3
			Appetite suppressant	1	
			Panacea		2
			Good for the liver	2	
		Infused raw in alcohol	Good for the stomach		4

				Stomach diseases		2
				100 diseases		6
				Good for the eyes		2
				Stomach pain		2
			Dried	100 diseases		2
				Good for the eyes		2
			Tea	Panacea		2
				Good for the eyes		3
				Diarrhoea		6
				Improve vision	1	
			Tincture	Flu		1
<i>Vaccinium vitis-idaea</i> L. (Ericaceae) SB010 NB061	Merişoare; Gogozeş; брусница; гогодзиş; гогдзіş (Brusnycia, gogodzyş; hohdziş)	Aerial parts	Tea	Good for the heart	1	
				Diabetes		1
				Diarrhoea	1	
				Good for the liver	1	
				Good for the stomach	1	
				Fever	1	
				Good for the kidneys	1	5
				Kidney diseases	1	
				Urinary tract diseases	1	
		Fruits	Any preparation	Blood pressure		3
			Raw	Blood pressure		1
				Panacea		1
				Vitamins		4
				Good for the kidneys		3
				Urolithiasis		1
				Good for the heart	1	
			Tea	Blood pressure	1	
				Panacea		2
				Good for the heart	1	1
Compote	Fever		1			
Juice	Fever	1				

			Syrup (without sugar)	Fever	1	
			Water source and fresh fruits/compote	Immune boosting	1	1
			Compote	Cough		1
			Any preparation	Flu		1
		Roots	Tea	Good for the bladder		1
<i>Valeriana officinalis</i> L. (Caprifoliaceae)	Валеріана (Valeriana)	Roots	Infused in alcohol	Heart disease		1
<i>Viburnum opulus</i> L. (Adoxaceae) NB223	Călină; калина (Kalyna)	Flowers	Tea	Fever		2
		Fruits	Tea	Blood pressure		7
				Good for the heart	4	
				Panacea	2	
				Cold	2	
				Cough	4	
				Good for the lungs	4	
				Fever		2
		Syrup	Blood pressure	Flu		1
				Fever		1
				Good for the heart		1
		Raw (with sugar)	Panacea			1
						1
Leaves	Boiled	Joint pain		1		
<i>Vitis vinifera</i> L. (Vitaceae) NB204	Виноград (Vynohrad)	Fruits	Wine	Good for blood		1
				Panacea		1

Specifically, 64 taxa were used among Romanian Hutsuls while 100 were used among Ukrainian Hutsuls, with 53 taxa shared in common (Figure 5). This disparity was also reflected in the number of DURs: 840 in Northern Bukovina and 585 in Southern Bukovina (-30%). This trend was also reported by Söukand and Pieroni (2016). The Jaccard Similarity Index did not vary much when considering all taxa (48) or only those mentioned by at least 10% of the interviewees (46).

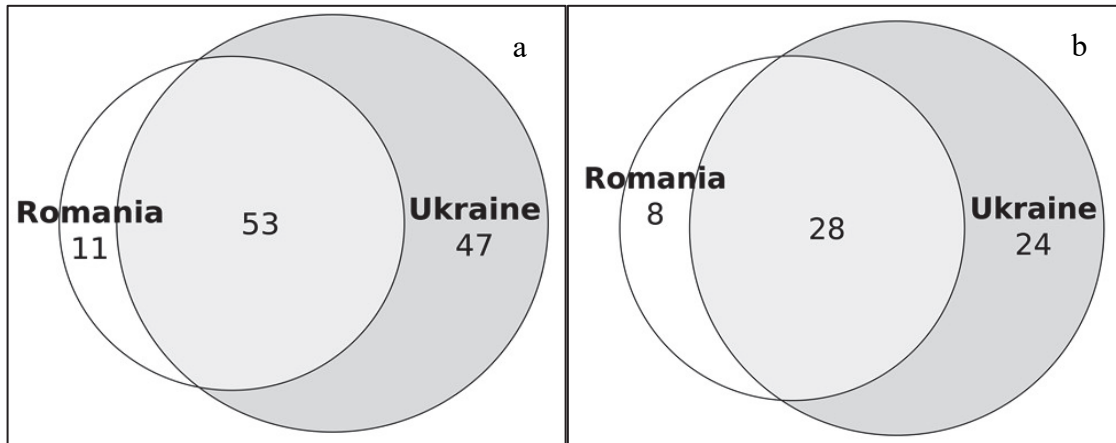


Figure 5a. The proportional Venn diagram shows that the majority of mentioned medicinal taxa were common to Hutsuls living in Northern and Southern Bukovina. However, a very large number of taxa were reported only in Ukraine; $JI = 48$.

Figure 5b. The proportional Venn diagram of medicinal taxa mentioned by at least three interviewees shows that Romanian Hutsuls used medicinal plants more consistently than Ukrainian Hutsuls. Indeed, 23 taxa were mentioned by only one or two Ukrainian Hutsuls. This result is in line with the findings regarding the use of food taxa; $JI = 46$.

The most common medicinal taxon was the same in both communities, namely *Vaccinium myrtillus* (78 DUR among Ukrainian Hutsuls and 45 DUR among Romanian Hutsuls). In Northern Bukovina, it was followed by *Rubus idaeus* (46 DUR), *Urtica dioica* (32 DUR), *Plantago major* (31 DUR) and *Vaccinium vitis-idaea* (27 DUR). In Southern Bukovina, it was followed by *Urtica dioica* (35 DUR), *Hypericum* sp. pl. (33 DUR), *Tilia* sp.pl. (32 DUR), and *Rubus idaeus* (27 DUR). Half of the reported medicinal DURs on both sides of the border are for cultivated plants, while wild species represent 24% and 31% of the reported taxa in Northern and Southern Bukovina, respectively.

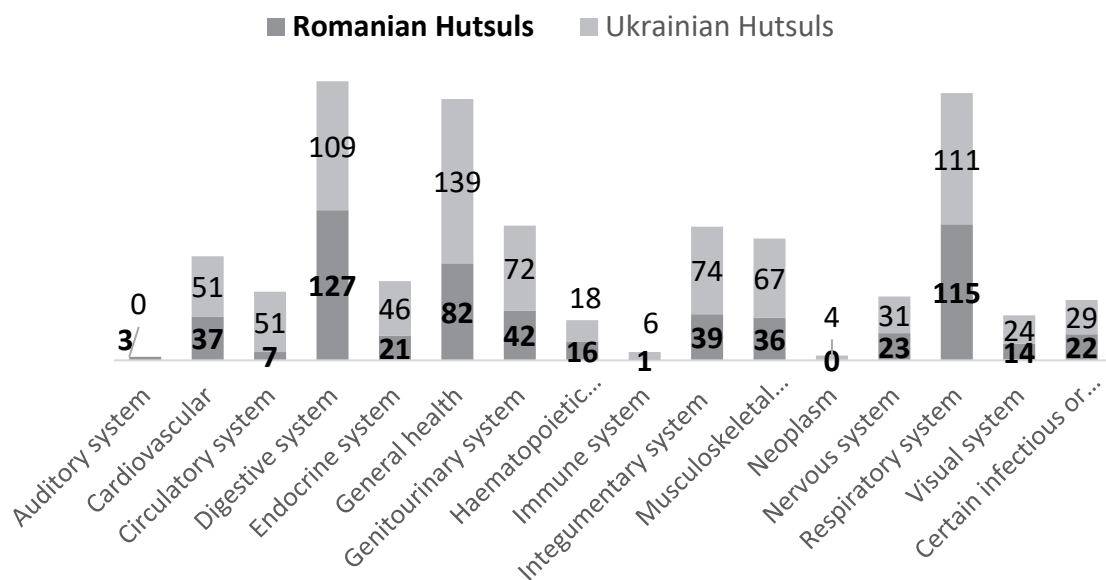


Figure 6. The distribution of medicinal DUR for the ICD-11 system categories shows that general health was the most important category among Ukrainian Hutsuls, while the digestive system was the most reported among Romanian Hutsuls. Both groups reported treating disorders of the respiratory system with medicinal plant preparations

Romanian Hutsuls particularly mentioned medicinal taxa for treating the respiratory system, the digestive system and for general health (Figure 6). In the first two cases, they reported more DURs than did Ukrainian Hutsuls. In Northern Bukovina, the first three medicinal categories reported by Hutsul interviewees were general health, the respiratory system and the digestive system.

Following the higher number of medicinal DUR among Ukrainian Hutsuls, they exceeded Romanian Hutsuls in all medicinal categories apart from those of the auditory, digestive and respiratory systems. Interestingly, cancer (neoplasm category, four taxa) was only mentioned in Ukraine, whereas in Romania two people reported a remedy for cancer using *Helleborus foetidus*, but then added that they do not to use it as it is very dangerous.

We recorded a total of 128 emic medicinal categories which were nearly equally distributed: 42 were reported by both communities, 41 among Romanian Hutsuls and 45 among Ukrainian Hutsuls.

Only 10 medicinal DURs used by at least 10% of each community were found on both sides of the border. Three DURs were included in the digestive category and specifically considered as good for the stomach: tea made from the seeds of *Carum carvi* (used by one fifth of the interviewees), dried aerial parts of *Hypericum perforatum* and any preparation of

Vaccinium myrtillus. Two musculoskeletal remedies include compresses of the leaves of *Arctium lappa* and the flowers of *Arnica montana* infused in alcohol, locally applied to treat joint pain. The aerial parts of *Rubus idaeus* are prepared as tea to reduce fever, while the aerial parts of *Urtica dioica* are boiled and used to wash the hair (for strong and shiny hair). More than 30% of both communities consider *Thymus* sp. pl. as a remedy for cough. Finally, the fresh leaves of *Plantago major* are locally applied to warts and the young sprouts of *Urtica dioica* are considered beneficial for cleansing the blood.

Knowledge transmission

We recorded eight sources of knowledge among both Romanian and Ukrainian Hutsuls. Three categories differ between the two groups: friends, professors and a local healer (in the past) were mentioned in Southern Bukovina, while television, the Internet and newspapers were mentioned in Northern Bukovina. When analysing these data in the framework of the abovementioned Van den Boog (2017) study, we observed that in 45% of cases Romanian Hutsuls transferred their knowledge vertically (from parents, grandparents and great-grandparents), 42% obliquely (via the elderly of the village), and 4% horizontally (through friends and neighbours), while 4% received knowledge from specialists (local healers and professors) and written sources (books) accounted for 2% (Figure 7). Among the books, one elderly interviewee mentioned Maria Treben's (1980) bestseller (for the preparation of *Primula* tea), but most of the Romanian Hutsuls said they did not have time for reading as there was always a lot of work in maintaining their small-scale farms. Moreover, all the Romanian people who mentioned books as a source of knowledge added that they would never have trusted this information as such, but they had a solid base of knowledge derived from oral sources and they have just added some information to it (for instance, they did not know a specific plant was useful for something, but they were already using it or part of it).

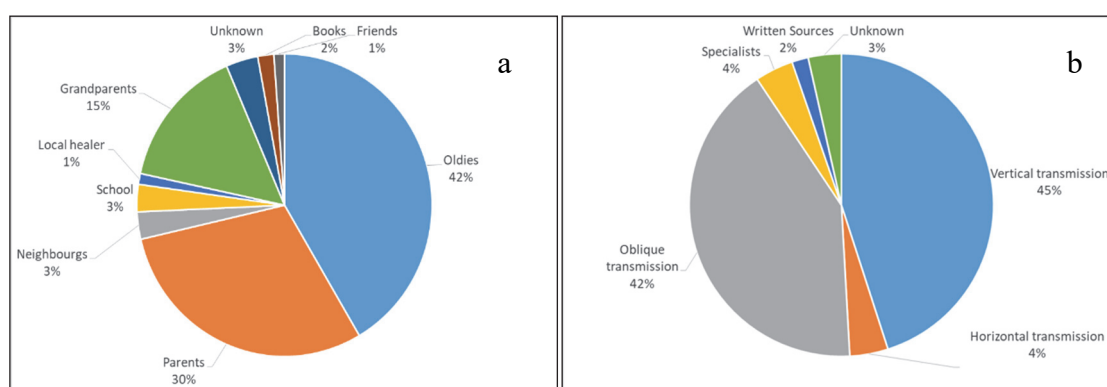


Figure 7a. Ecological knowledge transmission strategies among Romanian Hutsuls.

Figure 7b. Ecological knowledge transmission categories among Romanian Hutsuls grouped per strategy.

Among the Ukrainian Hutsuls, we recorded nearly the same proportion of vertical ecological knowledge transmission from parents and grandparents (48%), as well as the same amount of horizontal transmission from neighbours and oblique transmission from local elderly individuals (11%) (Figure 8). We also observed that 15% of knowledge was obtained from written sources including books and newspapers (“I read in the newspaper that a bath with *Chelidonium majus* and *Matricaria chamomilla* helps with allergies”, explained a women born in 1969), 6% from the Internet and 2% from television.

Comparing the two communities, we can observe that the elderly, and thus oblique LEK transmission, play a minor role among Ukrainian Hutsuls, while neighbours have a more important role (“Come to my neighbour, she knows everything”, advised an old woman born in 1928). Also, in Ukraine, no one reported having learnt from specialists, while mass media such as the Internet and television accounted for 8%, which added to the 15% from books and newspapers totals 23%, whereas this value is only 12% among Romanians.

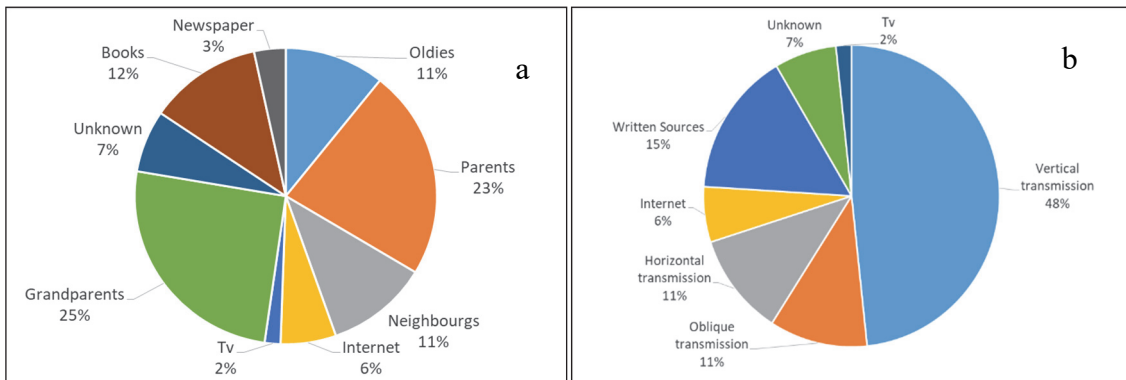


Figure 8a. Ecological knowledge transmission strategies among Ukrainian Hutsuls.

Figure 8b. Ecological knowledge transmission categories among Ukrainian Hutsuls grouped per strategy.

Moreover, while only one book was mentioned (Treben 1980) and another one was presented during interviews in Southern Bukovina (Mohan 2001), Ukrainian Hutsuls reported 16 books in both Ukrainian and Russian published between 1979 and 2016 (Table 3).

Popular books about medicinal plants in Northern Bukovina (Ukraine)

Books on medicinal plants were very popular in Ukraine and could be grouped based on the period of their publication. The first period of mass publication of books on wild medicine began in the 1970s. At that time, most of the books had an official reviewer controlled by

Moscow, as a rule a doctor or professor of medicine. The popularity of herbal medicinal books can be seen by the number of editions; for example, Dr. Karhut's "Medicine around us" was republished in 1975, 1978 and 1979. Hammerman and co-authors published the text book "Medical plants or plant-helpers" in 1978 and then again in 1979 for biological specialties and medical schools, which was adopted by the Ministry of Education of the USSR.

Table 3. Details of the books reported during interviews in Northern Bukovina, Ukraine.

Author	Year	Title	Publisher/City	Language	No of pages
Alekseev I. Dibrova A.	2012	Complete atlas of medicinal plants	Gloria, Kiev	Russian	400
Grechanyi I.	2015	The Great Illustrated Directory of Medicinal Herbs	Book club "Family Leisure Club", Kharkiv	Ukrainian	544
Grodzinsky AM.	1990	Medicinal plants: Encyclopedic reference book	"Ukrainska encyklopedia" MP Bazhana, Kiev	Ukrainian	544
Markova A.	2002	The Complete Encyclopedia of Folk Medicine	Esmo, Moscow	Russian	640
Pavlenko L.	1992	Drugs from Chardzilla	Veselka, Kyiv	Ukrainian	52
Reutov S.	2016	Natural healers of 1000 diseases	Book club "Family Leisure Club", Kharkiv	Russian	320
Rosola T. Rosola I. Rubish F.	2012	Medicinal plants of Transcarpathia in folk medicine	Patent, Uzgorod	Ukrainian	208
Ivashyn D. Katina Z. Rybachuk I. et al.	1983	Directory of preparations of medicinal plants harvest	Urozai, Kev	Russian	296
Safonov MM.	2015	Full atlas of medicinal plants	Bogdan, Ternopil'	Ukrainian	384
Schultz J. Uberguber E.	1994	Medicines from God's Pharmacy	Anfas, Kiev	Russian	207
Smik GK.	1991	Useful and rare plants of Ukraine	Ukrainska radyanska encyklopedia, Kiev	Ukrainian	416
Smolinskaya M. Korolyuk V. Galitska L.	2002	Medicinal plants of Bukovina	Ruta, Cernivci	Ukrainian	295
Sokolov C. Zamotayev I.	1988	Directory of Medicinal Plants.	Nedra, Moskow	Russian	464
Uzhegov H.	2011	The Complete Encyclopedia of Folk Medicine	Astrel, Moskow	Russian	1088
Henzel W.	2016	An illustrated herbalist. 350 species	Family Leisure Club, Kharkiv	Russian	256

Yelin Y.	1979	Plants of our forests	Soviet School, Kiev	Ukrainian	239
Zinchenko TV. Stakhiv IV. Myakushko T.	1990	Medicinal plants in gastroenterology	Naukova Dumka, Kiev	Russian	240

The second period started at the beginning of the 1990s when there were no longer censors, and therefore a boom of book publications took place; and indeed out of the 16 books mentioned during our interviews, 11 are from this period. Besides books, respondents named a variety of newspapers that specialized in recipes of wild and domesticated taxa for medicinal purposes. We recorded 8 different newspapers and magazines named by interviewees, e.g. “Alphabet of health”, “Health advice”, “Good doctor“, and “Granny”. These magazines were very cheap and promoted by the state postal service. Those publications included recipes from medical doctors as well as from people that “treated themselves” with specific remedies.

Different attitudes towards written and visual sources among Hutsuls on the two sides of the border

We observed a different attitude towards written sources between the two communities. While in Romania books were somehow perceived as unnecessary, not completely useful (as *the elderly know more*) and not to be trusted (as *the elderly know better*), in Ukraine they were a real source of pride. “We are very knowledgeable people, we go to libraries”, claimed a woman (born in 1966). Indeed, in Ukraine during the Soviet era, education and books were important ways of showing off, as boasted by a Hutsul woman (born in 1948): “I have an expensive book! (the medicinal plants book)”. This is because books were very rare and hard to get during Soviet times (Davis and Charemza 2002) Therefore, the large number of books shown during our interviews may be due to informants’ pride of being able to show that they are knowledgeable people who have the economic power to buy books and can acquire “high” knowledge (compared to the lesser importance of oral knowledge). Specifically, books regarding medicinal uses of plants were propagandized and it was a popular topic in schools and universities. In addition, phytotherapeutic knowledge was especially sought-after because the Soviet medical system relied heavily on herbal medicine, e.g. a special course on herbal medicine was offered at all medical universities of Soviet Ukraine (Hovsepyan et al. 2019). Indeed, this positive attitude towards “official” and written sources has been observed in other post-Soviet countries and confirms that book knowledge is considered especially trustworthy in these contexts (Krashenninnikova 2017).

Another difference between Ukrainian and Romanian Hutsuls is that neighbours are an important source of knowledge among the former, while a similar role is played by the elderly among the latter. Although it may simply be a phenomenon related to semantics (elderly individuals can also be neighbours), there may be more older and knowledgeable people in Romania, as in Ukraine a particular generation was deported to Siberia and never returned, or if individuals did return they did not live long (Coyne 2014) or were killed during WWII and the time of repressions (Vronskaya 2009).

Different perspectives on Hutsul ecological knowledge transmission patterns on both sides of the border

Our overall data reveals that LEK among Romanian and Ukrainian Hutsuls is transferred using different transmission patterns and sources. Indeed, among Romanians, the main rule seemed to be the experiential “uite, asta-i buna sau nu-i buna (look, this is good, this is not)” learnt from parents or the elderly of the village, as an 85-year-old Hutsul man reported. This attitude is clearly encompassed by the definition of traditional knowledge, as it is transmitted orally in the local language and characterized by ubiquitous dissemination. The other sources of knowledge accounted for only 6% in total.

Among Ukrainian Hutsuls, there is a larger proportion of knowledge that comes from other sources (23%). However, even though magazines and pamphlets were found to be an important source of knowledge in several post-Soviet countries (Handa et al. 2006; Krashennikova 2017), the Internet and television were not found to influence medicinal plant knowledge in other areas of Ukraine (Kołodziejska-Degórska 2010).

Socio-political factors affecting LEK in Northern Bukovina (Ukraine)

The reasons for the different knowledge transmission strategies may be found in the distinct social and political environments which the “new” border created. In Northern Bukovina, Hutsuls were part of a centripetal system that delivered services and information equally to every part of the USSR.

The educational system promoted by the Soviet Union significantly impacted the Hutsul way of thinking and living (Kibych 2010). All across Ukraine, this was implemented through both the mandatory teaching of the Russian language, which was required for any prestigious job (Kliucharev and Morgan 2008), and the promotion of “rural clubs”, which proposed new forms of political education such as mobile libraries and cinemas in order to reach people in

even very remote villages (Kliucharev and Morgan 2008). This kind of policy aimed to prevent the expression of local (Hutsul) identity by fostering the assimilation of Soviet culture in the Ukrainian territory (Bodnar 2015). Among others, the Soviet regime targeted the expression of Hutsul identity and many traditions and rituals were banned. For instance, wearing Hutsul clothing and singing traditional songs were not allowed (Chervinska et al. 2017). The traditional (religious) calendar was altered and only events devoid of any identitarian features were maintained (Chervinska et al. 2017).

The social landscape of Ukrainian Hutsuls abruptly changed in the 1940s when, concomitantly with border creation, drastic depopulation and the collectivization of farms and arable land occurred (Nowak and Tokarczyk 2014). Indeed, despite the meagre amount of arable land in the Carpathian valleys, many collective farms were established there, and in the area of Putyla as well (“There were collective farms and it was hard to live. I have been working since I was 14”, mentioned an elderly individual). Several interviewees reported that there were important wool factories, which benefitted from the large number of sheep present in this area of the Carpathians, in addition to the centralized management of the forest and the promotion of rural clubs (“Can you believe there was a cinema here?”, asserted a middle-aged male informant).

Socio-political factors affecting LEK in Southern Bukovina (Romania)

In Southern Bukovina, beginning in the 1960s, the Romanian government promoted rural systematization (“sistemizarea”) in order to foster the reconciliation of differences between urban and rural settlements (Connor 2017). However, in the following decade the government recognised the difficulty of rural systematization in the Carpathians, its limited economic potential and the existence of various difficulties, which were sociological, geographical and ethnographical in nature. Therefore, in the 1980s when the main priority turned to agriculture, the project of rural systematization in the Carpathian Mountains was definitively abandoned (Connor 2017). In support of this thesis, some local interviewees reported not having experienced the collective farms (otherwise widespread in Romania), due to the limited agricultural productivity of the area. Moreover, local interviewees claimed that livestock and game used to belong to the State, but due to the vastness of the area, the harshness of the steep terrain and communication difficulties, there was not much control in the mountains where Hutsuls live. Therefore, the peripheral location of the area with regard to Romania, as well as its lying along the border and its ethnolinguistic peculiarity prevented

this area from being subjected to the centralization policies implemented throughout most of the country (in fact, Romanian Hutsuls reported that only between the 1960s and 1989 were the local forests managed by the central government). As a consequence, ethnobotanical knowledge among Romanian Hutsuls was mainly maintained through vertical transmission (as other sources of knowledge were not widely available).

The effects of these different socio-political contexts on medicinal LEK

Therefore, the creation of the border and the consequent socio-political contexts unevenly affected the LEK of Romanian and Ukrainian Hutsuls, despite a common ethnolinguistic background, very similar environmental conditions and the peripherality of these areas in their respective geopolitical contexts. Indeed, in Romania the area in which Hutsuls live was considered remote and of limited economic interest and as a result left behind in the implementation of the “sistematizarea”. In Ukraine, the centripetal power of Moscow was stronger and thus eliminated the concept of peripherality. The reforms were indeed implemented with the same intensity throughout Soviet territory, and the Russian language and collective farms were imposed.

The different success of the policies of the Soviet and Romanian regimes, therefore, differently affected Hutsul LEK. While Romanian Hutsul LEK appears to have been somehow “frozen/static” during the twentieth century, as they were not systematically affected by centralization policies or other factors, Ukrainian Hutsuls were strongly influenced by the new language (Russian) which served as a vector for new (and sometimes technical) knowledge, including the transmission of plant knowledge especially through books and newspapers. Therefore, in addition to vertical knowledge transmission among Ukrainian Hutsuls, we found that other sources of knowledge played an important role. As described in Table 4, these two kinds of LEK sources differ especially with regard to geographical range: while TEK is strictly situational and local and may vary from village to village, other sources may have a wider geographical range, thus encompassing some elements foreign to the community but common to other contexts.

Table 4. Characteristics of knowledge sources among Bukovinian Hutsuls.

Characteristics	Knowledge mainly orally transmitted	Knowledge in which borders between written and oral forms of knowing nature and practicing this knowledge are more blurred
Language	Mainly local language (Hutsul) but also official languages (Romanian and Ukrainian)	Mainly official languages (Romanian and Ukrainian) but also foreign languages (Russian)
Accessibility	Widely accessible within the village	Not necessarily available within the village.
Geographical range	Strictly situational and local, sometimes varies from village to village	Large geographical ranges (often defined by official language expansion)
Ingredients used	Always local or easily attainable	Not necessarily local

Different pathways of medicinal LEK in Northern and Southern Bukovina

Our analysis highlights different trends for food and medicinal LEK among Ukrainian and Romanian Hutsuls. While food uses were quantitatively and qualitatively comparable, about 30% more medicinal uses were reported among Ukrainian Hutsuls. We consider that this might be due to the low availability of physicians and long distances in the sparsely inhabited Hutsul valleys (despite official statistics reporting 3.51 physicians per 1000 inhabitants in Ukraine versus 1.47 in Romania in 1980, World Bank 2020), as well as the unavailability of synthetic drugs in health centres.

The higher number of medicinal plants may also be a reaction to Soviet policies which promoted allopathic medicines, discouraging traditional plant-based medicines (Kliucharev and Morgan 2009); for example, a middle-aged Ukrainian women fiercely claimed “My mother is 77 years old and has never used a single pill in her life”, and also another women who stated “Listen to what is said about medicinal plants so that you do not get sick and do not have to take pills. We drink teas made from Carpathian herbs”. This phenomenon may have been fostered by the severe economic crisis which affected Ukraine after the collapse of the Soviet Union. Indeed, we observed that during this period, medicinal plants were highly promoted by mass media and books; out of the 16 books Ukrainian Hutsuls showed us, 11 were published in this period (1990s).

In the Romania of Ceaușescu, “everyone had the right to be hospitalized”, agreed a middle-age couple; however, a younger male interviewee (born in 1974) also reported that “at that time (when I was child) there were no doctors, no roads, but there were people who knew plants”, which was confirmed by an older Hutsul woman (born in 1927) who stated “when I arrived here (from Ukrainian Bukovina, after border creation), I learnt everything from a

local healer and my neighbour. All I knew at the time I came here was the plants we had to harvest for the army during school hours. Among them I remember arnica”. Therefore, it follows that medicinal knowledge in Romania was to some extent ubiquitous, although some local healers held more (maybe also literary) knowledge and were considered reference points within the Hutsul community.

We could not obtain the source of knowledge for each plant, but we can identify some pan-Soviet elements which were not found on the Romanian side of the border. Indeed, we can observe some of the consequences of the reforms implemented in the Soviet era such as the cultivation of *Panax ginseng*, *Ginkgo biloba*, *Aloe vera*, *Aronia melanocarpa* and *Elaeagnus rhamnoides* and their medicinal uses. Specifically, *Aronia melanocarpa* gained popularity in the late 1940s when the Soviet Union started large-scale cultivations for the production of juices and jams. However, it was also used as herbal medicine, especially as an antihypertensive and anti-atherosclerotic, in several countries of Eastern Europe including Ukraine (Kokotkiewicz et al. 2010). Another example of LEK of pan-Soviet origin is the use of *Elaeagnus rhamnoides*, whose industry, just as with *Aronia melanocarpa*, grew in the 1940s. Its oil was reported in the Russian Pharmacopeia as an anti-inflammatory (Panossian and Wagner 2013).

As observed by Fedorak (2009), despite several changes Bukovina has faced since Austro-Hungarian times, Hutsuls have fiercely strived to maintain their culture, which has been possible, in part, to their scattered dwellings and the remoteness of the mountains. However, the creation of the border resulted in different socio-political circumstances which affected Hutsul LEK in different ways on each side of the border.

Finally, more and more people have resorted to frequenting pharmacies, probably also fostered by globalization and increased economic means (especially among Romanian Hutsuls, who are now European Union citizens). This trend was observed among both Romanian and Ukrainian Hutsuls who often answer to our questions “now everyone goes to the pharmacy”.

Conclusions

We found a total of 118 food and medicinal plants from 107 genera and 53 families. Among Hutsuls of Northern Bukovina we recorded 107 taxa, while there were 72 taxa among

Hutsuls of Southern Bukovina. The most used plants were the same in both communities: *Vaccinium myrtillus*, *Rubus idaeus* and *Urtica dioica*.

Despite a common cultural and linguistic background, the ethnobotanical knowledge transmission occurs in different ways on each side of the border. Family is a primary source of ethnobotanical knowledge transmission on both sides of the border; however, in Romania knowledge from other sources is very limited, whereas in Ukraine interviewees reported several other sources including books, magazines, newspapers, the Internet and television. Indeed, this is especially evident when analysing the wild plants used for medicinal purposes. While recorded food uses are comparable in the two Hutsul communities, our overall data show a disparity regarding the medicinal use of plant taxa. Ukrainian Hutsuls reported around 30% more plant taxa than Romania Hutsuls. The latter group mentioned almost exclusively locally available plants, whereas the former group reported some plants not mentioned by Romanians such as *Aloe vera*, *Maclura pomifera*, and *Aronia melanocarpa*. Knowledge regarding these plants was probably not transferred vertically, within the same family, but by other sources of knowledge such as books, newspapers, magazines and possibly radio, as a consequence of the policies implemented during the Soviet era, including the widespread promotion of Russian language and culture, as well as allopathic drugs. Therefore, this may imply hybridization of the local body of knowledge with foreign elements originating in the Soviet context which has enriched the corpus of ethnobotanical knowledge held by Ukrainian Hutsuls.

Further research should specifically address the plant taxa recently introduced in the body of LEK of Ukrainian Hutsuls in order to understand how such knowledge was conveyed and absorbed by Hutsul mountain communities.

Authors' contributions

RS designed the study, GM and NS conducted the fieldwork, GM analysed the data and drafted the manuscript with major contributions from all the authors. NS performed a first analysis of the food uses and drafted the section regarding Ukrainian book sources and its table. RS and AP supervised the study. All authors read and approved the final manuscript.

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Chapter 2: Borders as crossroads: the diverging routes of herbal knowledge of Romanians living on the Romanian and Ukrainian sides of Bukovina

Introduction

Local medical systems are part of a larger local ecological knowledge corpora held by local communities. According to Díaz-Reviriego et al. (2016), those medical systems are based on two elements: the availability of local resources considered “medicinal”, which generally derive from mineral products, animals, plants or mushrooms; and ethnomedicinal knowledge, which is developed from the longstanding interaction of a community with the surrounding environment. Therefore, local medical systems are especially fostered by communities living in highly biodiverse contexts, such as the Carpathian Mountains, whose richness results from a combination of several factors, including altitude gradient, geographical position, geomorphology, and landscape heterogeneity (Mráz and Ronikier 2016).

The richness of landscapes is fostered by complex interactions developed over the centuries by local mountain communities and is an important characteristic of the Carpathian area (Angelstam et al. 2013; Babai et al. 2015; Cioacă and Dinu 2010). In addition, landscape richness is also fostered by the wealth of cultural diversity promoted by the transnational nature of the Carpathians, where borders are often rich in biocultural diversity (Liu et al. 2020) and thus may promote a richer corpus of local ecological knowledge (LEK), and specifically medicinal knowledge.

Indeed, ethnomedicinal knowledge is not static, but evolves according to several elements such as changes in ecological availability (Júnior et al. 2013) and socio-economic conditions (Srithi et al. 2009; Byg et al. 2010; Andriamparany et al. 2014; Menendez-Baceta et al. 2015), yet the effect of the political context on medicinal knowledge remains largely underexplored. In fact, while it has been highlighted as an important element of the context in which LEK is produced (e.g. Posey and Dutfield 1996), it has rarely been researched, and

is limited to folk medicinal uses in time of war (e.g. Volpato et al. 2007; Adnan et al. 2014). A few plant-based ethnomedicinal studies have been carried out in the Carpathians mountains, specifically among Hungarian minorities (Papp et al. 2014a; 2014b), Hutsuls (Sõukand and Pieroni 2016; Mattalia et al. 2020b), and Boykos (Pieroni and Sõukand 2017), as has a historical perspective on ethnomedicine at the Polish-Ukrainian border (Kozłowska et al. 2018).

In recent times, cross-border and cross-cultural studies have received increasing attention as cultural or political borders can serve as an useful variable to detect the extent to which the different political conditions that existed in two territories may have contributed to shaping the use of medicinal knowledge. In the Carpathian region, the case of Bukovina is quite unique. This historical region, which for centuries was “one” territory, was split by the Soviet Union in 1940, and since 1991 it has been part of both independent Ukraine (Northern Bukovina) and Romania (Southern Bukovina).

Within this framework, the aim of this study was to compare plant-based medicinal uses among Romanians living across the Romanian-Ukrainian border and to perform cross-cultural and cross-border analysis with the ethnomedicine of neighboring Hutsuls (Mattalia et al. 2020b) to assess whether Romanians share more medicinal knowledge with Hutsuls living in the same country (Ukraine or Romania) or with Romanians living on the other side of the border.

The specific objectives were:

- to document and compare medicinal plant knowledge among Romanians living across the Romanian-Ukrainian border;
- to correlate the findings on medicinal plant knowledge among Romanians with a previous study on Hutsul ethnomedicine;
- to explore how the language in which medicinal plants are mentioned may contribute to the possible influence of knowledge origin among Romanians living in Ukraine; and
- to discuss whether local ethnomedicine is more similar under the same socio-political conditions, within the same country (among Hutsuls and Romanians) or in different countries but among the same ethnolinguistic group.

Materials and Methods

The study area

Bukovina is a historical region of Eastern Europe which partially lies in the Carpathian Mountains. From the second half of the 14th century to 1774 Bukovina belonged to the Principality of Moldova, after which it was occupied by the Austrian Empire until 1918 when the region became part of the Kingdom of Romania. In the 1940s Bukovina was divided in two: the Northern part was occupied by the Soviet Union and became territory of the Ukrainian Soviet Republic until 1991 when it became part of independent Ukraine, while Southern Bukovina has remained part of Romania.

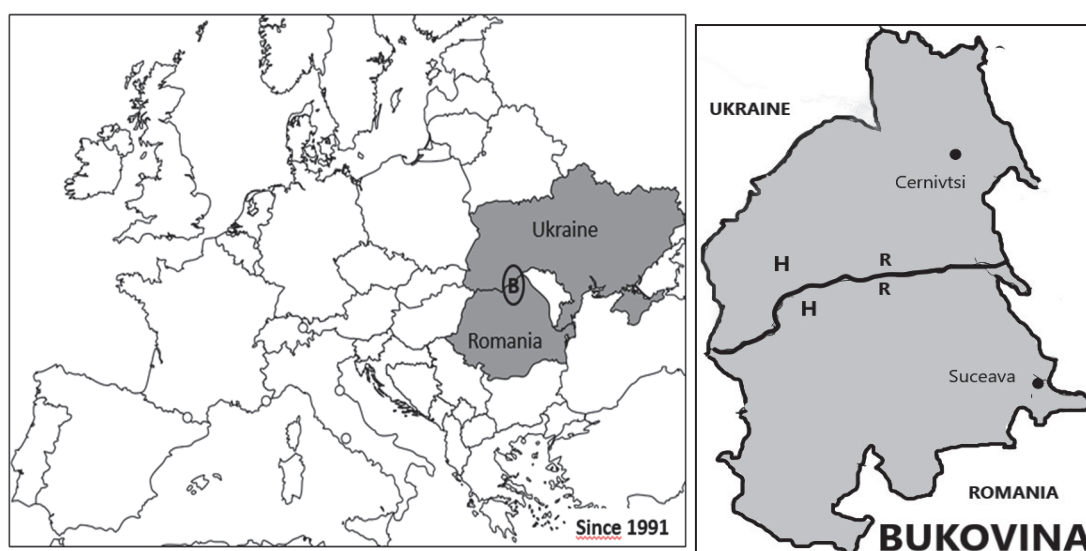


Figure 1. Map of the study area.

The study area is located at the Romanian-Ukrainian border and includes one town on the Romanian side and one main town (including many parishes) on the Ukrainian side. On the European map, “B” indicates the position of Bukovina, while the map of Bukovina depicts our study area in which “R” stands for Romanians and “H” stands for Hutsuls, whose plant-based ethnomedicine is discussed in Mattalia et al. (2020b).

Table 1. Details of the study area

Group	Romanians living in Romania (RR)	Romanians living in Ukraine (UR)
Number of interviews	29	30
Main municipality	Sraja (Suceava region)	Krashnoilsk (Storozhenets region)
Languages of the interview	Romanian	Romanian, Russian, Ukrainian

When gathered	Summer 2019	Summers 2018 and 2019
Landscape	Hilly (400-500 m a.s.l.), mainly covered by small fields (e.g. corn), meadows and forest	Plain (200-300 m a.s.l.), mainly meadows

On both sides of the border, Romanians live in rural communities mainly devoted to family agriculture and small-scale animal husbandry. Yet, on the Ukrainian side, the effect of emigration to Western Europe is especially evident, with a remittance economy starting to replace traditional activities.

Methods

We conducted extensive fieldwork in Northern and Southern Bukovina in the summers of 2018 and 2019. The interviewees were conveniently selected near their homes, in their gardens, and in the street, sometimes using a snowball method. First, the study was introduced and prior oral informed consent was obtained. This study strictly followed the ethical guidelines of the International Society of Ethnobiology and the methodology was approved by the Ethics Committee of Ca' Foscari University. We conducted 59 semi-structured interviews which consisted of open-ended questions about folk medicinal uses. Current and past preparations for treating different ailments and disorders were elicited by naming each part of the body (e.g. head, ear, mouth, etc.) and asking about the mode of preparation and application. In addition, we collected background information regarding their age, length of time living in the area, main occupation, education, parents' native language and religion. Finally, we inquired as to where the interviewee had learned about such medicinal uses. We attempted to ask plant by plant, but often interviewees could not remember each single use/plant and generally referred to the same sources of knowledge for every plant/use they mentioned. We conducted 17 interviews in Romanian, 2 in Russian, 2 in Ukrainian and 9 using a mixture of Russian, Ukrainian and sometimes Romanian. Interviews primarily in Russian and Ukrainian were carried out by the second author who is a native-Ukrainian and has near-native knowledge of the Russian language. Interviews in Romanian were carried out by the first author, with the help of the third author, for the majority of interviews in Ukraine. In Romania, interviews were conducted with a native Romanian speaker as a facilitator.

The same methods as those employed in Mattalia et al. 2020b were used here, as both studies were carried out under the framework of the same DIGe project, which looks to assess the

influence of centralization and political scenarios on the use of wild plants for medicinal purposes. In this study, 30 interviews were conducted in each area (one interview in Southern Bukovina was discarded as the interviewee was selling medicinal products made using only knowledge derived from books).

Whenever possible, we collected herbaceous wild voucher specimens with the help of our interviewees. The Ukrainian voucher specimens are stored in the 'Roztochya' Nature Reserve (Ukraine) bearing codes NB001–NB259, while the Romanian specimens are stored in the Herbarium of Ca' Foscari University of Venice (Italy) bearing codes SB001–SB096. Voucher specimens were identified using the 'The Plant List' (2013) and 'Flora Europaea' (Tutin et al. 1964). Plant families were classified according to Stevens (2001 and onward).

The responses were coded in detailed use reports (DUR) using emic categories and entered into an Excel spreadsheet for comparison. Each plant-based DUR contained interview code, language of the interview, Latin name of the plant species, local name (and its transliteration according to <https://slovnyk.ua/translit.php> for Ukrainian plant names and <https://www.calc.ru/transliteratsyya.html> for Russian plant names), language of the plant name, plant part used, preparation method, emic purpose of use, and related etic system following the ICD-11 (World Health Organization, 2019).

To perform the cross-cultural and cross-border comparison we calculate the Jaccard Index (JI) as follows: $JI = (C / (A + B - C)) \times 100$, where C is the number of uses common to A and B, A is the number of uses in sample A, and B the number of uses of sample B (González-Tejero et al. 2008).

To calculate the proportion of each knowledge transmission strategy, we assigned a total of 1 point to each interviewee. For instance, if the interviewee reported only one source of knowledge (e.g. grandparents), we assigned a value of 1; two sources (e.g. books and parents), we assigned 0.5 to each; three sources, 0.33 to each, etc. Then, we summed these values according to the emic categories of knowledge sources mentioned by the interviewees (folk, books, parents, etc.) on both sides of the border.

On the Ukrainian side, Romanians often spoke a mixture of languages including Romanian, Russian and Ukrainian. To perform the linguistic analysis, we considered only the 17 interviews conducted in Romanian. We organized each plant name according to the language in which it was mentioned. We considered 5 categories: Romanian, non-Romanian (Ukrainian or Russian), international (when a plant has very similar names in the three

languages), multilanguage (when the interviewee provided the plant name in two or more languages), and dialect (when the plant name was not reported among Romanians living in Romania and a) was not included or b) was included as a dialect name in the Romanian dictionary DEX). The linguistic analysis was not performed among Romanians living in Romania as they were monolingual (Romanian). The average age of the interviewees was 60 years old in Ukraine and 63 years old in Romania. Gender distribution in both areas was 80% female and 20% male; and all interviewees were born in the Bukovina region. In both areas, the interviewees were Orthodox Christian, except for two people that were Baptist. Most of the Romanian interviewees in Southern Bukovina were retired (53.33%), while 36.67% were employed outside the home, 6% worked in small-scale family farming, 2% were on parental leave, and 2% were unemployed. Only 2 interviewees had higher education, while half of the interviewees had primary education and 12 people had secondary education. In Northern Bukovina, 45% of interviewees had primary education, 37% secondary education, 8% basic education, 5% specialist education, and 5% higher education. As in the Romanian part of Bukovina, the most of the interviewees in Ukraine were retired (60%), while 20% were employed outside the home and 20% worked in small-scale family farming.

Results

Cross-border comparison of medicinal plants used among Romanians living across the Bukovinian border

We recorded the medicinal use of 108 plant taxa belonging to 45 families (Table 2).

*Table 2 Recorded medicinal plants among Romanians living in Romania (RR) and in Ukraine (UR). Local names are in Romanian, except for § (plant named in Ukrainian), @ (plant named in Russian), §@ (plant named using a term common to both Ukrainian and Russian), * (plant named with a mixture of two languages), & (plant named in the local dialect).*

Latin name	Local names	Part used	Preparation	Use	System ICD-11	RR	UR
<i>Abies alba</i> Mill. (Pinaceae)	Brad	Twigs	Tea	Cold	Respiratory	2	0
			Syrup/Tea	Good for the lungs		4	0
			Syrup	Cough		6	0
				Sore throat; Good for the throat		4	0
				Respiratory ways		3	0
<i>Achillea millefolium</i> L. (Asteraceae) SB011	Coada șoricelului; Coada	Aerial parts	Tea	Good for the stomach	Digestive	15	3

SB050 SB074 NB060 NB117	șoarecului; тисячелітні к @ (Tysiachelitn ук @)			Good for the intestine		0	2	
				Diarrhea		0	1	
				Stomach pain		0	2	
				Pancreatitis		0	1	
				Abdominal pain		0	1	
				Good for the liver		7	0	
				Good for the abdomen		2	0	
				Nausea		2	0	
				Good for bile		1	0	
				"Waking up the female side"		Genitourina ry	0	1
				Women's problems			3	3
				Good for the kidneys			3	1
				Bladder problems			0	2
				Genital problems			1	0
				Good for the urinary tract			1	0
				Good for the heart		Cardiovasc ular	1	0
				Intestinal worms		Certain infectious diseases	2	0
				Parasites			2	0
				Pinworm			2	0
				Panacea		General health	7	1
Relaxing	Nervous	1	0					
<i>Acorus calamus</i> L. (Acoraceae)	Zmăoaică	Roots	Tea	Digestive	0	2		
			Infused in alcohol		Good for the stomach	0	3	
					Abdominal pain	0	2	
					Good for kidneys	0	1	
<i>Aesculus hippocastanum</i> L. (Sapindaceae) SB057 NB067	Caștan; каштан § (Kashtan §)	Flower s	Infused in alcohol and locally applied	Certain infectious diseases	0	2		
			Good for the joints		Musculoske letal	0	6	

				Good for the skin		0	2
		Fruits		Good for the joints		0	2
<i>Allium cepa</i> L. (Amaryllidaceae)	Сeară; цiбуля § (Tsybulia §)	Bulbs	Fresh	Lowering blood pressure	Circulatory	2	0
				Relaxing	Nervous	2	0
			Tea/Fresh	Cough	Respiratory	0	2
		Fomentation	Healthy	General health	0	1	
		Whole plant	Any preparation	Thrombus	Circulatory	0	1
<i>Allium sativum</i> L. (Amaryllidaceae)	Usturoi; чеснок@ (Chesnok@)	Bulbs	Fresh	Good for the heart	Cardiovascular	3	0
				Blood thinning	Circulatory	2	0
				Cold	Respiratory	0	2
<i>Allium ursinum</i> L. (Amaryllidaceae)	Usturoi de padure; Leurdă; Usturoiul ursului	Leaves	Fresh in salad	Detox	General health	2	0
				Good for immunity	Immune	2	0
<i>Alnus</i> sp. pl. (Betulaceae)	Arin	Twigs	Tea	Diarrhea	Digestive	0	1
<i>Aloe</i> sp. pl. (Xanthorrhoeaceae)	Aloe; алое § (aloie §)	Leaves	Infused in alcohol	Stomach ache	Digestive	0	1
			Ointment with fat, locally applied	Hemorrhoids		0	1
			Fresh, locally applied	Warts	Certain infectious diseases	1	0
				Good for the skin	Integumentary	0	2
<i>Althaea officinalis</i> L. (Malvaceae)	Nalbă mare	Flowers	Tea	Good for the colon	Digestive	1	0
<i>Anethum graveolens</i> L. (Apiaceae) SB032	Mărar; крип § (Kryp §)	Seeds	Tea	Pain relief	General health	0	2
				Good for the stomach	Digestive	0	2
				Children's abdominal pain and intestinal gas		2	0
				Good for the stomach	0	1	
		Aerial parts	Lowering blood pressure	Circulatory	0	2	
<i>Arctium lappa</i> L. (Asteraceae) SB052 SB091	Brusture; лопух § (Lopukh §)	Roots	Fresh	Panacea	General health	1	0
			Infused in alcohol	Rheumatism	Musculoskeletal	2	0

		Leaves		Cancer	Neoplasm	2	0
			Tea	Wounds	Integumentary	0	1
			Tea	Good for the stomach	Digestive	2	0
				Good for bile		2	0
			Gently pressed and locally applied	Varices	Circulatory	1	0
				Heel pain	Musculoskeletal	0	1
				Joint pain		1	3
				Headache	Nervous	2	3
				Foot pain	General health	2	0
				Fever		0	1
				Warts	Certain infectious diseases	0	2
			Heel cracking	Integumentary	0	1	
			Aerial parts	Boiled	Good for the hair	Integumentary	0
<i>Armoracia rusticana</i> P.Gaertn., B.Mey. & Scherb. (Brassicaceae) SB031 NB028	Hrean	Leaves	Boiled	Blood cleansing	Hematopoietic	0	1
		Roots	Locally applied	Joint pain	Musculoskeletal	0	1
<i>Arnica montana</i> L. (Asteraceae)	Arnica	Roots	Infused in alcohol	Good for the stomach	Digestive	2	0
				Ulcer		2	0
		Flowers	Promoting cicatrization	Integumentary	0	1	
<i>Artemisia absinthium</i> L. (Asteraceae) SB005	Pelín	Aerial parts	Bath	Good for the feet	General health	1	0
				Women's problems	Genitourinary	1	0
			Tea	Detox	General health	1	0
				Blood cleansing	Hematopoietic	1	0
				Good for bile	Digestive	1	0
				Good for the stomach		4	0
				Good for the liver		2	0
				Hepatitis		2	0
				Fresh	Worms (in children)	Certain infectious diseases	0
			Infused in alcohol	Organism cleansing	General health	0	2
<i>Artemisia dracunculus</i> L. (Asteraceae)	Tarhon	Aerial parts	Tea	Panacea	General health	0	2

SB015 SB029								
<i>Asplenium scolopendrium</i> L. (Aspleniaceae)	Limba cerbului	Aerial parts	Tea	Good for the liver	Digestive	1	0	
				Good for the stomach		1	0	
				Good for the heart	Cardiovascular	1	0	
				Vascular diseases		1	0	
				Good for the blood	Hematopoietic	1	0	
<i>Avena sativa</i> L. (Poaceae)	Овсянка @ (ovsianka)	Seeds	Tea	Podagral	Musculoskeletal	0	1	
				Diarrhea		Digestive	0	1
				Constipation		0	1	
<i>Beta vulgaris</i> L. (Amaranthaceae) SB026	Sfeclă roșie	Tubers	Fresh	Cough	Respiratory	1	0	
				Anemia		Hematopoietic	1	0
			Juice	Anemia	Hematopoietic	1	0	
				Cough		Respiratory	1	0
				Cancer	Neoplasm	0	2	
<i>Betula pendula</i> Roth. (Betulaceae) SB087 NB155 NB040	Mesteacăn; березаș (bereza)	Buds and small leaves	Tea	Good for vessels	Circulatory	0	2	
				Good for the prostate		Genitourinary	0	2
		Sap	Fresh	Good for the gallbladder	Digestive	1	0	
				Good for the kidneys		Genitourinary	1	0
				Panacea	General health	3	0	
				Organism cleansing		0	2	
<i>Bidens tripartita</i> L. (Asteraceae) NB090	Turiță; череда § (chereda §)	Aerial parts	Bath	Good for the skin	Integumentary	0	4	
				Skin cleansing		0	4	
			Tea	Allergies	Immune	0	2	
				Diabetes		Endocrine	0	1
				Blood cleansing		Hematopoietic	0	1
<i>Brassica oleracea</i> L. (Brassicaceae)	Varză (verde); Curechi; капуста § (kapusta §)	Leaves	Gently pressed and locally applied	Joint pain	Musculoskeletal	6	6	
				Gout		0	2	
<i>Calendula officinalis</i> L. (Asteraceae) NB170	Gălbenele; нагідки § (Nahidky §)	Flowers	Tea	Good for bile	Digestive	2	0	
				Good for the liver		10	1	
				Sore throat	Respiratory	0	1	
				Headache		Nervous	1	0

				Bone pain	Musculoskeletal	1	0
				Genital problems	Genitourinary	1	0
				Disinfecting	General health	3	0
				Good for the heart	Cardiovascular	2	0
			Bath	Good for the colon	Digestive	1	0
				Women's problems	Genitourinary	0	2
			Ointment	Good for the skin/ Dry skin	Integumentary	9	0
				Dried heels		1	0
				Pimples		1	0
				Burns		1	0
				Warts	Certain infectious diseases	2	0
				Cold	Respiratory	1	0
				Varices	Circulatory	1	0
				Foot/Hand/ Leg/Joint pain	Musculoskeletal	3	1
				Dislocation	Injury	1	0
				Sores	General health	1	0
				Panacea		0	1
				Mastitis	Genitourinary	0	1
			Tampon	Cervix	Genitourinary	0	1
<i>Capsella bursa-pastoris</i> (L.) Medik. (Brassicaceae) SB012 NB218	Traista ciobanului; папуша сумка § (Pastusha sumka §)	Aerial parts	Boiled	Incontinence	Genitourinary	0	1
			Tea	Panacea	General health	1	0
				Women's problems	Genitourinary	1	0
<i>Capsicum annuum</i> L. (Solanaceae)	Chiparușcă &	Fruits	Any preparation	Thrombus	Circulatory	0	2
<i>Carpinus betulus</i> L. (Betulaceae)	Граб § (Hrab §)	Wood	Burned for soap	Body cleansing	General health	0	2
<i>Carum carvi</i> L. (Apiaceae) SB007 NB037	Săcărică; Secărica; Chimion; кмин § (kmyn §)	Aerial parts (including seeds)	Infused in alcohol	Healthy	General health	1	0
			Tea	Diarrhea	Digestive	10	0
				Good for the stomach/ Stomach pain		12	12
				Stomach closing		4	0
				Good for the liver		1	0

				Abdominal pain		2	0	
				After giving birth	Pregnancy	1	0	
				Panacea	General health	1	0	
				Organism cleansing		1	0	
				Cough	Respiratory	0	2	
<i>Chelidonium majus</i> L. (Papaveraceae) SB003 NB154	Rostopasca; чистотел @ (Chistotel @)	Aerial parts	Tea	Good for the liver	Digestive	9	2	
				Good for the prostate	Genitourinary	1	0	
				As an antibiotic	Immune	1	0	
				Joint pain	Musculoskeletal	1	0	
				Sore throat	Respiratory	1	0	
				Ulcer	Digestive	0	2	
		Ointment	Hemorrhoids	Digestive	0	1		
		Infused in alcohol	Good for bile	Digestive	2	0		
			Cancer	Neoplasm	0	1		
		Sap	Locally applied	Warts	Certain infectious diseases	4	1	
				Cuts	Integumentary	1	0	
Good for the eyes	Visual			0	1			
Roots	Tea	Women when weak	General health	0	2			
<i>Cichorium intybus</i> L. (Asteraceae) SB046	Cicoarea	Flowers	Tea	Good for the abdomen	Digestive	2	0	
				Good for the intestine		2	0	
				Constipation		2	0	
<i>Crataegus monogyna</i> Jacq. (Rosaceae) SB064 NB234	Păducel; боярышник @; боярышник @ глід§; Malaieş (boiaryshnyk @; boiaryshnik @, hlid)	Twigs	Tea	Blood pressure normalization	Circulatory	6	3	
		Flowers and Fruits		Good for the heart		Cardiovascular	12	5
		Flowers		High blood pressure		Circulatory	0	4
				Good for the liver		Digestive	0	2
<i>Cucumis melo</i> L. (Cucurbitaceae)	Pepene	Fruits	Locally applied	Good for the skin	Integumentary	0	1	
<i>Cucumis sativus</i> L. (Cucurbitaceae)	Огірок § (Ohirok §)	Stems	Tea	Calmant (for children)	Nervous	0	2	

<i>Cucurbita pepo</i> L. (Cucurbitaceae)	Гарбуз § (Harbuz §)	Seeds	Fresh	Good for the stomach	Digestive	0	2
			Tea	Stimulate appetite	General health	0	2
				Prostatitis	Genitourinary	0	2
<i>Daucus carota</i> L. (Apiaceae)	Morcov	Roots	Fresh	Improve vision	Visual	3	0
			Juice	Blood cleansing	Hematopoietic	0	1
				Cancer	Neoplasm	0	2
<i>Dipsacus pilosus</i> L. (Caprifoliaceae)	Scaius	Aerial parts	Locally applied	Joint pain	Musculoskeletal	0	2
<i>Elaeagnus rhamnoides</i> (L.) A. Nelson (Elaeagnaceae)	Cătina	Fruit	Syrup	Immune system	Immune	4	0
			Tea	Cough	Respiratory	2	0
				Blood pressure normalization	Circulatory	1	0
			Dried	Panacea	General health	2	0
<i>Equisetum arvense</i> L. (Equisetaceae) SB020 NB093	Barbursului; Coadacalului; хвощ польовий § (Khvoshch polovyi §)	Aerial parts	Tea				
				Blood cleansing	Hematopoietic	1	0
				Panacea	General health	4	0
				Good for the kidneys	Genitourinary	5	4
				Water eliminating		2	0
				Genital problems		1	0
				Good for the prostate		1	0
				Good for the bladder	1	4	
			Bath	Food and hand pain	Musculoskeletal	0	2
			<i>Fragaria vesca</i> L. (Rosaceae) SB094 NB071	Fragi; Frăguț; земляника@; ягоди§ (Zemlianika@; yahody §)	Whole plant	Tea	Panacea
Fruits	Syrup/Tea	Healthy			General health	0	2
	Tea/Fresh	Fever			General health	0	2
	Fresh	Vitamin provider			Endocrine	0	2
Fruits/Aerial parts	Tea/Fresh	Good for the heart			Cardiovascular	0	1
<i>Galium verum</i> L. (Rubiaceae) SB093 NB150	Sânzâiene	Aerial parts	Tea	Good for the thyroid	Endocrine	0	1
<i>Ginkgo biloba</i> L. (Ginkgoaceae)	гінго білоба §	Aerial parts	Tea	Good for the brain	Nervous	0	1

	(Hinho biloba §)							
<i>Helianthus annuus</i> L. (Asteraceae)	Florea-soarelui	Seeds	Oil, locally applied	Good for the ear	Auditory	2	0	
<i>Helianthus tuberosus</i> L. (Asteraceae)	Топинамбур § (Торунамбуr §)	Tuber	Tea	Joint pain	Musculoskeletal	0	2	
				Leg pain		0	2	
<i>Helichrysum maracandicum</i> Popov (Asteraceae)	Безсмертник @ (Beszmertnik)	Aerial parts	Tea	Good for the liver	Digestive	0	2	
				Good for the stomach		0	2	
<i>Hordeum</i> sp. pl. (Poaceae)	Orz	Seeds	Locally applied	Back pain	Musculoskeletal	0	1	
<i>Humulus lupulus</i> L. (Cannabaceae) SB081 NB163	Hamei	Flowers	Tea	Blood pressure normalization	Circulatory	1	0	
Hypericum sp. pl. (Hypericaceae) SB092 SB068 NB148	Појарница; Sunătoare; зверобой@; звіробій § (Zveroboi @; zvirobii §)	Aerial parts	Tea	Good for the stomach/Stomachache	Digestive	13	16	
				Diarrhea		0	3	
				Gastritis		0	2	
				Pancreatitis		0	1	
				Good for the abdomen/Abdominal pain		0	4	
				Indigestion		2	0	
				Good for the liver		4	0	
				Panacea		General health	5	1
				Healthy			0	2
				Organism cleansing			1	0
				Diabetes		Endocrine	2	0
				Relaxing		Nervous	4	3
				Headache			3	0
				Women's problems		Genitourinary	3	0
				Sore throat		Respiratory	1	0
Good for the heart	Cardiovascular	1	0					
<i>Juglans regia</i> L. (Juglandaceae) SB051 NB153	Nuc; горіх § (gorih§)	Leaves	Tea	Good for the hair	Integumentary	6	0	
		Husk		Good for the hair	Integumentary	1	0	
		Fruits		Cough	Respiratory	0	1	
		Unripe fruits	Infused in alcohol	Diarrhea	Digestive	0	1	

			Syrup	Tongue cuts (in children)		0	1
<i>Lamium album</i> L. (Lamiaceae) SB025	Urzică cu floare albă; Urzică înflorită; Urzică moartă; мертвая урдзика (Mertvaia urdzyka)*	Aerial parts	Tea	Women when weak	General health	0	2
			Aerial parts	Women's problems	Genitourinary	1	0
<i>Lavandula</i> sp. pl. (Asteraceae)	Lavanda	Flowers	Mixed tea/Bath	Relaxing	Nervous	1	1
<i>Leonurus cardiaca</i> L. (Lamiaceae)	Talpa găștei	Aerial parts	Tea	Good for the heart	Cardiovascular	0	1
				Relaxing	Nervous	0	1
<i>Levisticum officinale</i> W.D.J. Koch (Apiaceae) SB030	Leuștean	Aerial parts	Tea	Weight-loss	Endocrine	2	0
			Infused in white wine	Detox	General health	2	0
<i>Lilium candidum</i> L. (Liliaceae) SB049	Lilia albă*; Crin; Crin alb; лилия@; лілія§ (Lilia#@)	Flowers	Infused in alcohol	Burns	Integumentary	0	1
				Wounds		0	1
				Good for the skin		0	5
				Cuts		4	0
				Warts	Certain infectious diseases	9	3
				Joint pain	Musculoskeletal	2	2
				Disinfecting	General health	2	0
<i>Linum usitatissimum</i> L. (Linaceae)	Лен § (Len §)	Seeds	Tea	Podagra	Musculoskeletal	0	1
			Boiled	Abscesses	Certain infectious diseases	0	2
			Tea	Gastritis	Digestive	0	2
			Boiled and locally applied	Joint pain	Musculoskeletal	0	1
				Wounds	Integumentary	0	2
<i>Lycopodium clavatum</i> L. (Lycopodiaceae) SB053 SB054	Pedicuța	Aerial parts	Tea	Joint pain	Musculoskeletal	2	0
				Good for the liver	Digestive	3	0
				Jaundice		2	0
<i>Malus domestica</i> L. (Rosaceae) SB038	Mere	Fruits	Vinegar	Promoting digestion	Digestive	2	0
			Juice	Gall stones		0	1
				Blood cleansing	Hematopoietic	0	1
			Uzvar	Healthy	General health	0	1

<i>Malva</i> sp. pl. (Malvaceae) SB024 NB199	Nalbă	Aerial parts (including flowers)	Tea	Cough	General health	0	2	
				Bronchitis	Respiratory	0	1	
				Good for the throat		0	2	
<i>Matricaria chamomilla</i> L. (Asteraceae) SB002 SB019 NB171	Mușețel; Romaniță; ромашка § (Romashka §)	Aerial parts	Tea	Constipation	Digestive	3	0	
				Good for the intestine		2	1	
				Good for the teeth		2	2	
				Colic		1	0	
				Good for the stomach		1	7	
				Diarrhea		0	2	
				Gastritis		0	2	
				Good for the abdomen/ Abdominal pain		0	2	
				Tooth removal		0	2	
				Stomach cleansing		0	2	
				Jaundice		0	1	
				Body cleansing (children)		Integumentary	3	5
				Wounds			0	2
				Cold	Respiratory	1	0	
				Cough		1	1	
				Good for the throat/ Sore throat		3	1	
				Disinfecting	General health	7	0	
				Warming up		0	1	
				Panacea		2	5	
				Good for children		0	1	
				Pain relief (children)		0	2	
				Fever		0	8	
				Relaxing		Nervous	2	0
				Good for the prostate		Genitourinary	1	0
				After giving birth	Pregnancy	2	0	
				Flu	Certain infectious diseases	0	1	

				As an antibiotic	Immune	0	1	
			Gargling with honey	Sore throat	Respiratory	2	0	
			Bath	Women's problems	Genitourinary	3	0	
				Hemorrhoids	Digestive	0	1	
			Ointment	Good for the skin	Integumentary	2	0	
			Locally applied	Eye cleansing	Visual	4	1	
				Conjunctivitis		2	0	
				Warts	Certain infectious diseases	2	0	
				Dried heels	Integumentary	1	0	
<i>Melissa officinalis</i> L. (Lamiaceae) SB095	Melisa	Aerial parts	Tea	Good for the heart	Cardiovascular	0	2	
				Relaxing	Nervous	0	1	
<i>Mentha</i> sp. (Lamiaceae) SB014 SB016 SB034 SB096 NB172 NB025	Izma; Menta calului; Mintă; Menta chiparata нінта&; минти&; (Ninta&; mynty&)	Leaves	Tea	Good for the heart	Cardiovascular	0	2	
				Relaxing	Nervous	4	8	
				Headache		1	0	
				Panacea	General health	3	0	
				Diarrhea	Digestive	2	0	
				Good for the stomach		5	0	
				Good for the abdomen/Abdominal pain		2	0	
				Good for the liver		3	0	
				After giving birth	Pregnancy	1	0	
				Flu	Certain infectious diseases	0	1	
				Infused in alcohol	Mosquito bites	General health	0	1
					Cancer	Neoplasm	0	1
<i>Ocimum basilicum</i> L. (Lamiaceae)	Busuioc	Aerial parts	Bath	Ringworm	Certain infectious diseases	2	0	
			Tea	Fever	General health	0	1	
			Tea	Good for children		1	0	
			Tea	Depression	Mental	2	0	
			Tea	Headache	Nervous	2	0	

<i>Origanum vulgare</i> L. (Lamiaceae) SB036 NB099	Sovârf; şovary; материнка§ (materynka §)	Aerial parts	Tea	Flu	Certain infectious diseases	0	1	
				Women's problems	Genitourina ry	0	4	
				Breathing	Respiratory	0	1	
				Bronchitis		0	1	
				Good for the lungs		0	1	
				Panacea (99 diseases/17 diseases)	General health	2	2	
				Good for organism		0	1	
				Good for the stomach	Digestive	1	1	
				Headache	Nervous	2	0	
<i>Petroselinum crispum</i> (Mill.) Fuss (Apiaceae) SB033	Pătrunjel; петрушка § (Petrushka §)	Aerial parts	Tea	Good for the teeth	Digestive	1	0	
				Detox	General health	2	0	
				Wounds	Integument ary	0	1	
		Roots		After giving birth	Pregnancy	1	0	
				Women's problems	Genitourina ry	0	2	
				Good for the kidneys		0	3	
				Prostatitis		0	2	
				Weight- loss	Endocrine	0	2	
<i>Phaseolus vulgaris</i> L. (Fabaceae)	Fasole	Pod exocar p	Tea	Weight- loss	Endocrine	1	0	
<i>Picea abies</i> (L.) H. Karst. possibly including <i>Abies alba</i> Mill. (Pinaceae) SB008 SB021 NB043	Molid; хвоя § (Khvoia § needle)	Twigs	Syrup	Good for the lungs	Respiratory	5	0	
				Fever (children)	General health	2	0	
				Sore throat	Respiratory	5	0	
				Cold	Respiratory	1	0	
			Tea/Syrup	Cough	Respiratory	8	0	
				Panacea	General health	2	0	
				Tea	Good for the liver	Digestive	1	0
			Bath	Hemorrhoi ds	Digestive	0	1	
				Hand and Foot pain	Musculoske letal	0	1	
				Needle s	Bath	Joint pain	Musculoske letal	0
			Relaxing		Nervous	0	2	
<i>Plantago lanceolata</i> L.		Leaves	Tea	Cough	Respiratory	1	0	

(Plantaginaceae) SB037	Pătlagină îngustă; Limba soacrei; Minciuna	Roots	Tea	Good for the lungs	Respiratory	2	0
<i>Plantago major</i> L. (Plantaginaceae) SB066 NB161	Pătlagină (lată)	Leaves	Syrup	Panacea	General health	2	0
				Good for the throat	Respiratory	1	0
				Good for the respiratory ways		2	0
			Syrup/Tea	Cough	Respiratory	4	3
			Tea	Good for the stomach	Digestive	0	1
				Gastric diseases		0	1
			Locally applied	Bronchitis	Respiratory	0	1
				Wounds	Integumentary	0	4
				Cuts	Integumentary	1	0
				Hand and Foot pain	Musculoskeletal	0	2
				Good for the skin	Integumentary	0	4
				Warts	Certain infectious diseases	7	1
				Skin disease (roza)	Integumentary	0	1
Disinfecting	General health	0	1				
<i>Potentilla anserina</i> L. (Rosaceae)	Coadă racului	Whole plant	Tea	Panacea	General health	1	0
<i>Primula veris</i> L. (Primulaceae)	Ciuboțica cucului; первоцвіт§ (Pervotsvit§)	Flowers	Tea	Cough	Respiratory	1	0
				Liver problems	Digestive	0	2
		Aerial parts	Tea	Good for the abdomen	Digestive	1	0
				Good for the organism	General health	1	0
				Relaxing	Nervous	2	0
Good for the lungs	Respiratory	2	0				
<i>Prunus avium</i> (L.) L. (Rosaceae) SB059	Cireș	Stalks	Tea	Good for the kidneys	Genitourinary	3	0
				Good for the urinary tract		2	0
<i>Prunus cerasus</i> L. (Rosaceae) SB045	Vișine; Cireș amar; вишня §	Twigs	Tea	Flu	Certain infectious diseases	0	2

	(Vyshnia §)			Fever	General health	0	2
				Healthy		1	0
				Cold	Respiratory	0	2
		Fruits	Infused in alcohol and sugar	Diarrhea	Digestive	0	1
				Good for the stomach	Digestive	0	1
				Infused in alcohol	Headache	Nervous	2
		Stalks	Tea	Jaundice	Digestive	2	0
				Good for the liver		2	0
				Good for the kidneys	Genitourinary	1	0
<i>Prunus domestica</i> L. (Rosaceae)	Prun; Perja	Seeds	Fresh	Parasites	Certain infectious diseases	1	0
				Organism cleansing	General health	1	0
		Fruits	Fresh	Constipation	Digestive	0	1
				Uzvar	General health	General health	0
<i>Pyrus communis</i> L. (Rosaceae) SB080	Pere	Fruits	Uzvar	Healthy	General health	0	1
<i>Quercus</i> sp. pl. (Fagaceae) SB056 NB160	Stejar; дуб § (Dub §)	Bark (and leaves)	Bath	Hemorrhoids	Digestive	0	3
<i>Raphanus sativus</i> L. (Brassicaceae)	Ridiche neagră; редька § (Redka §)	Roots	Boiled	Cough	Respiratory	0	1
			Raw	Good for the liver	Digestive	2	0
				Good for the kidneys	Genitourinary	2	0
				Healthy	General health	2	0
<i>Rheum rhaponticum</i> L. (Polygonaceae)	Ravint	Stalks	Syrup	Good for the liver	Digestive	2	0
				Good for ulcers		2	0
<i>Rhododendron myrtifolium</i> Schott & Kotschy (Ericaceae)	Bujor de munte	Flowers	Syrup	Asthma	Respiratory	1	0
				Bronchitis		1	0
				Cold (in children)		1	0
<i>Rhus typhina</i> L. (Anacardiaceae)	NO NAME	Flowers	Boiled	Abdominal pain	Digestive	0	1
				Good for the stomach		0	1
<i>Ribes nigrum</i> L. (Grossulariaceae) SB043	Смородіна §; кокци де нягри (Smorodina §; koktsy de niahry &)	Fruits	Fresh	Good for the heart	Cardiovascular	0	1
				High blood pressure	Circulatory	0	3
				Blood pressure		0	2

				normalization			
			Tea/Syrup	Healthy	General health	0	4
<i>Robinia pseudoacacia</i> L. (Fabaceae) SB041	Salcâm	Flowers	Tea	Good for the lungs	Respiratory	2	0
				Cough (children)		0	1
				Cold		1	0
				Good for the heart	Cardiovascular	3	0
				Relaxing	Nervous	6	0
				Panacea	General health	1	0
				Good for children		2	0
		Leaves	Tea	Good for the liver	Digestive	2	0
<i>Rosa canina</i> L. (Rosaceae) SB062 NB083	Măceș; Casadîr; свербигузка §; (Sverbyhuzka §)	Fruits	Tea	Cold	Respiratory	1	0
				Cough		1	0
		Aerial parts (including flowers)		Good for the heart	Cardiovascular	0	5
				Good for the kidneys	Genitourinary	0	5
		Flowers/Roots		High blood pressure	Circulatory	0	5
				Good for the liver	Digestive	0	2
<i>Rubus idaeus</i> L. (Rosaceae) SB009 SB071 NB082	Zmeură; малина §; маліна @ (Malyna §; malina @)	Fruits	Syrup/Fresh	Healthy	General health	2	2
			Juice/Fresh/Infused in alcohol	Fever	General health	0	6
		Aerial parts	Tea	Improve vision	Visual	3	0
				Flu	Certain infectious diseases	0	9
				Good for the stomach	Digestive	1	0
				Women's pains	Genitourinary	1	0
				Good for women	General health	1	0
				Fever		0	5
				Panacea		0	1
				Sleep inducing		3	0
				Cold		Respiratory	0
				Cough		0	1
				<i>Rubus</i> sp. pl. including <i>R. caesius</i> L. (Rosaceae) SB083	Mure; ежевика @; чорниця §	Aerial parts	Tea
Good for the liver	Digestive	2	0				

NB001, NB062	(Yezhevyka @; chornytsia §)			Good for the stomach		2	0
				Diabetes	Endocrine	2	0
				Hair loss	Integumentary	0	1
				High blood pressure	Circulatory	0	1
		Fruits	Syrup/ Fresh	Healthy	General health	2	2
			Tea	Cold	Respiratory	0	2
	Fresh	Fever	General health	0	2		
<i>Rumex acetosa</i> L. (Polygonaceae) SB076 NB081	Macriş	Aerial parts	Tea	Panacea	General health	0	1
			Fresh	Bronchitis	Respiratory	0	1
<i>Rumex patientia</i> L. (Polygonaceae)	Stejie; Stevie	Roots	Tea	Diarrhea	Digestive	4	1
				Good for the stomach		0	1
			Locally applied	Joint pain	Musculoskeletal	0	2
<i>Salix</i> sp. pl. (Salicaceae) SB040 SB047 NB073	Răchită; Верба § (Verba §)	Wood	Burned for soap	Body cleansing	General health	0	2
		Twigs	Tea	Joint pain	Musculoskeletal	0	2
				Leg pain		0	2
<i>Salvia officinalis</i> L. (Lamiaceae) SB028	Salvia	Leaves	Tea	Good for children	General health	1	0
				Menopause	Genitourinary	1	0
			Tea	Good mood	Mental	2	0
			Tea	Relaxing	Nervous	2	0
<i>Sambucus nigra</i> L. (Adoxaceae) SB084	Soc; бузина § (Buzyna §)	Flowers	Tea	Cough (children)	Respiratory	3	9
				Improve breathing		0	2
				Good for the lungs		2	1
				Sudorific	Integumentary	2	0
				Blood pressure normalization	Circulatory	0	2
				Flu	Certain infectious diseases	0	2
				Fever	General health	0	3
			Syrup/Tea	Cold	Respiratory	5	1
			Sore throat	6		0	
			Healthy	General health	3	0	

<i>Solanum lycopersicum</i> L. (Solanaceae)	Roşie	Fruits	Gargling with lemon	Sore throat	Respiratory	0	1	
<i>Solanum tuberosa</i> L. (Solanaceae)	Cartofi; Barabule; картошка @ (kartoshka @)	Tuber	Locally applied	Headache	Nervous	2	4	
			Fomentation	Cough	Respiratory	0	1	
				Women's problems	Genitourinary	0	2	
<i>Solidago virgaurea</i> L. (Asteraceae)	Splinuţa	Aerial parts	Tea with <i>Lamium album</i>	Good for the kidneys	Genitourinary	0	1	
<i>Sorbus aucuparia</i> L. (Rosaceae)	рябина@; чорная рябина @ (ryabina @; chornaia ryabina @)	Fruits	Juice/Tea	High blood pressure	Circulatory	0	5	
<i>Symphytum officinale</i> L. (Boraginaceae) SB070 NB176, NB177	Tătăneasă; Iarbă tatei &; Iarbă lui tatin &; живокост§ (Zhyvokost §)	Roots	Bath	Body cleansing	General health	0	1	
			Ointment	Leg pain	Musculoskeletal	0	2	
			Rubbed fresh/poultice/ infused in alcohol	Joint pain	Musculoskeletal	3	5	
			Locally applied	Fracture	Injury	0	1	
				Heel pain	Musculoskeletal	0	1	
			Infused in alcohol	Rheumatism	Musculoskeletal	2	0	
				Rubdown	General health	1	0	
				Pain relief		2	0	
			Tea	Healthy	General health	1	0	
			Whole plant	Tea	Panacea	General health	2	0
			Leaves/Roots	Locally applied	Warts	Certain infectious diseases	3	0
Leaves	Infused in alcohol	Dislocation	Injury, poisoning or certain other consequences of external causes	2	0			
Roots and Flowers	Tea	Vascular diseases	Cardiovascular	1	0			
<i>Syringa vulgaris</i> L. (Oleaceae)	Liliac	Aerial parts	Tea	Cough	Respiratory	0	1	
<i>Taraxacum campylodes</i> G.E.Haglund (Asteraceae) SB063	Păpădia; Pască gaine &; Curul	Roots	Tea	Asthma	Respiratory	0	2	
		Flowers	Syrup	Good for the throat/ Sore throat	Respiratory	2	0	

NB084	găinii & кульбаба§ Одуванчики @ (kulbaba §; Oduvanchiki @)			Bronchitis		1	1	
				Good for the lungs		0	1	
				Asthma		1	0	
				Cold		3	0	
				Good for children	General health	0	1	
				Panacea		1	0	
				Good for the liver	Digestive	4	0	
				Liver detoxing		2	0	
				Good for immunity	Immune	1	0	
				Fresh	Lung problems	Respiratory	1	0
				Chewing fresh	Stomach cleansing	Digestive	0	1
				Tea	Cancer	Neoplasm	0	1
Aerial parts	Tea	Good for the liver	Digestive	2	1			
Stems	Fresh	Good for the liver	Digestive	2	0			
<i>Thymus</i> sp. pl. including <i>T. serpyllum</i> L. and <i>T. vulgaris</i> L. (Lamiaceae) SB001 SB090 NB027, NB030	Cimbrisor; Cimbru; чебрець§ (Chebrets §)	Aerial parts	Tea	Panacea	General health	2	0	
				Healthy		0	2	
				Headache	Nervous	1	0	
				Good for the stomach	Digestive	2	0	
				Good for the heart	Cardiovascular	1	0	
				Cold	Respiratory	0	2	
				Good for the lungs		0	1	
				Bronchitis		0	1	
				Tea/Fomentation	Cough	Respiratory	0	7
<i>Tilia cordata</i> Mill. (Malvaceae) SB017 NB253	Tei; липа § (Lyra §)	Flowers	Bath	Body cleansing	General health	0	1	
			Tea	Good for the heart	Cardiovascular	1	0	
				Cough	Respiratory	1	0	
				Sore throat		1	0	
				Cold		5	2	
				Good for the lungs		1	0	
				Panacea	General health	0	1	
				Fever (children)		3	2	
				Healthy		1	0	
				Diabetes	Endocrine	2	0	
				Cramps	Nervous	1	0	
				Relaxing		14	0	
				Headache		1	0	

				Flu	Certain infectious diseases	0	2
<i>Trifolium</i> sp. pl. (Fabaceae) SB075 SB077 SB078 SB072 NB076	Trifoi roșu; Trifoi; клевер @ (Klever@)	Aerial parts	Tea	Good for the heart	Cardiovascular	0	3
				Good for the organism	General health	0	2
				Headache	Nervous	0	2
				Gastritis	Digestive	0	2
			Good for the gallbladder			0	2
Bath	Leg and Foot pain	General health	0	1			
<i>Tussilago farfara</i> L. (Asteraceae) SB065 SB085 NB070	Podbal	Leaves	Tea	Good for the stomach	Digestive	0	1
			Infused in alcohol and locally applied	Good for the skin	Integumentary	0	1
<i>Urtica dioica</i> L. (Urticaceae) SB088 NB026	Urzică	Aerial parts	Tea/Fresh	Blood/Vessel cleansing	Hematopoietic	9	8
		Aerial parts	Tea/Soup	Good for blood circulation	Circulatory	6	0
			Shampoo	Good for the hair	Integumentary	4	6
			Soup	Vitamin provider	Endocrine	0	1
			Tea	Blood changing	Hematopoietic	1	0
				Hair loss	Integumentary	0	1
				Good for bones	Musculoskeletal	0	2
				Blood pressure normalization	Circulatory	2	0
				Good for the heart	Cardiovascular	1	0
			Good for the stomach	Digestive	1	0	
			Panacea	General health	0	1	
		Kidney stones	Genitourinary	0	1		
		Headache	Nervous	0	1		
Whole plant	Tea/Fresh	Iron provider	Endocrine	6	0		
<i>Vaccinium myrtillus</i> L. (Ericaceae) SB006 NB060	Afina; черника @ (Chernika @)	Fruits	Fresh	Improve vision	Visual	3	0
			Fresh/Jam	Good for eyes		3	2

			Tea/Fresh/Infused in alcohol/Syrup	Stomach pain	Digestive	2	6
			Dried/Infused in alcohol	Diarrhoea		2	3
			Jam	Pancreatitis		0	1
			Infused in alcohol	Abdominal pain		0	1
		Aerial parts	Tea	Diabetes	Endocrine	3	0
				Improve vision	Visual	8	0
				Good for the eyes		2	0
		Good for stomach	Digestive	3	0		
<i>Vaccinium vitis-idaea</i> L. (Ericaceae) SB010 NB061	Merișoare; Merișor	Aerial parts	Tea	Fever	General health	1	0
				Panacea		0	1
				Improve vision	Visual	2	0
				Good for the eyes		2	0
				Good for the heart	Cardiovascular	2	0
				Women's problems	Genitourinary	2	0
<i>Valeriana officinalis</i> L. (Caprifoliaceae)	Valeriană; валериана § (valeryana §)	Roots	Infused in alcohol/Tea	Good for the heart/ Heart problems	Cardiovascular	2	1
<i>Viburnum opulus</i> L. (Adoxaceae) NB157	Calina; калина § (kalyna §)	Fruits	Tea	Cold	Respiratory	1	0
				Flu	Certain infectious diseases	1	0
			Tea/Syrup/Raw	Cough (children)	Respiratory	5	5
			Tea/Fresh	Blood pressure normalization	Circulatory	1	6
			Fresh	Tuberculosis	Respiratory	0	1
<i>Viola</i> sp. pl. including <i>V. tricolor</i> L. (Violaceae) SB079	Panseluța; Trei frați pătați	Aerial parts	Tea	Allergies	Immune	2	0
<i>Viscum album</i> L. (Santalaceae)	Vasc	Aerial parts	Tea	Good for the heart	Cardiovascular	2	0
<i>Vitis vinifera</i> L. (Vitaceae)	Strugure	Leaves	Tea	Diabetes	Endocrine	1	0
<i>Zea mays</i> L. (Poaceae)	Porumb; кукурудза § (kukurudza §)	Fruit	Bath	Joint pain	Musculoskeletal	0	2
				Cough	Respiratory	1	0
				Good for the kidneys	Genitourinary	4	6

				Good for the urinary tract		0	1
<i>Zingiber officinale</i> Roscoe (Zingiberaceae)	Imbir	Tuber	Tea	Organism cleansing	General health	0	2

Fifty-four taxa were common to both Romanian communities, 20 were found only among Romanians living in Romania and 34 only among Romanians living in Ukraine, corresponding to a JI of 50 (Fig. 2). When we considered only those plant taxa mentioned by at least 3 interviewees (about 10% of the interviews), we observed a JI of 52, with 61 taxa in total, of which half (32) were common across the border, 11 were found only among Romanians in Romania and 18 only among Romanians in Ukraine. Thus, 44% of the taxa were mentioned by only one or two people in each community.

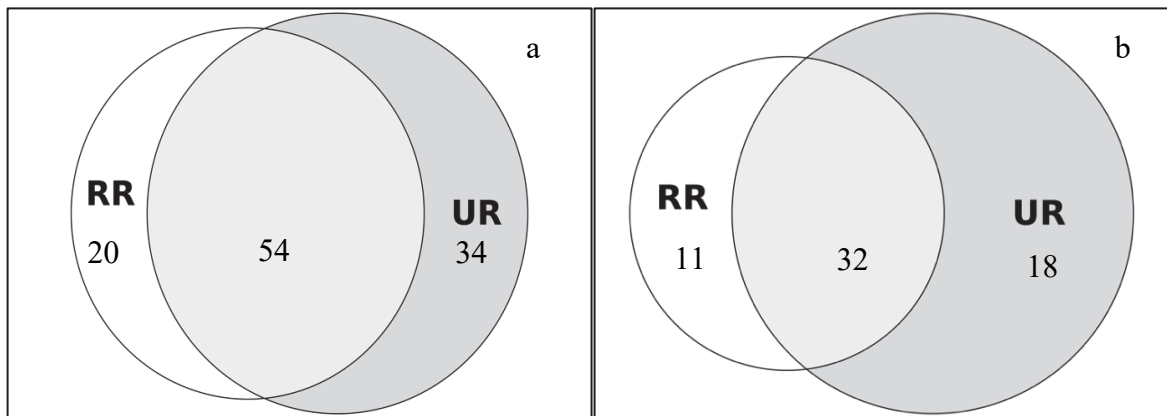


Figure 2. Proportional Venn diagram of taxa used by Romanians living in Romania (RR) and in Ukraine (UR). Diagram A considers all taxa, while diagram B includes only taxa mentioned by at least 3 people. $JI A = 0.49$; $JI B = 0.50$.

The two most important taxa among Romanians living in Ukraine were common to the two communities and included *Matricaria chamomilla* L. (47 DUR in Romania and 51 in Ukraine), *Hypericum* sp. pl. (39 DUR in Romania and 32 in Ukraine). While the two most important taxa in Romania (*Achillea millefolium* L. (50 DUR) and *Calendula officinalis* L. (42 DUR)) were more rarely used among Ukrainian Romanians. The most important families were Asteraceae (13 taxa), followed by Rosaceae (11 taxa) and Lamiaceae (8 taxa). Among Romanians living in Romania, 58% of the taxa were wild, while this value was 53% among Romanians living in Ukraine.

Regarding the number of DUR, we recorded 18% fewer DUR among Romanians living in Ukraine, as they often reported using medicines from the local pharmacy or from abroad.

Linguistic analysis of plant names mentioned by Romanians living in Ukraine

While Romanians living in Romania only speak Romanian, the linguistic analysis of plants mentioned by Romanians living in Ukraine revealed that only 65% of the plants were named in Romanian (Fig. 3), whereas 16% were mentioned in Ukrainian and/or Russian, and 6% were given in multiple language, thus providing a name in Romanian and its equivalent in one or more other languages. Eight percent were international names (e.g. *Aesculus hippocastanum*, *Viburnum opulus*, *Melissa officinalis*, *Aloe* sp. pl.), while 5% were local dialect names including “chiparusca” for *Capsicum annuum*, “curul găinii” for *Taraxacum campyloides*, “iarba tatei” or “iarba lui tatin” for *Symphytum officinale*, “curechi” for *Brassica oleracea*, and “minciuna” for *Plantago major*. In some instances, languages were mixed within the same plant name as was the case for *Lamium album*, which was called “Mertvaia urzica” where mertvaia is the Russian translation of moartă (dead) and urzică is Romanian for *Urtica dioica*. Indeed, in Romanian “urzică moartă” is the name for *Lamium album*. A similar situation was observed for *Lilium album*, locally called “lilia alba”, which is a mixture of the Ukrainian name “lilia” (in Romanian it would be “crin”) and the Romanian adjective “alba” (white).

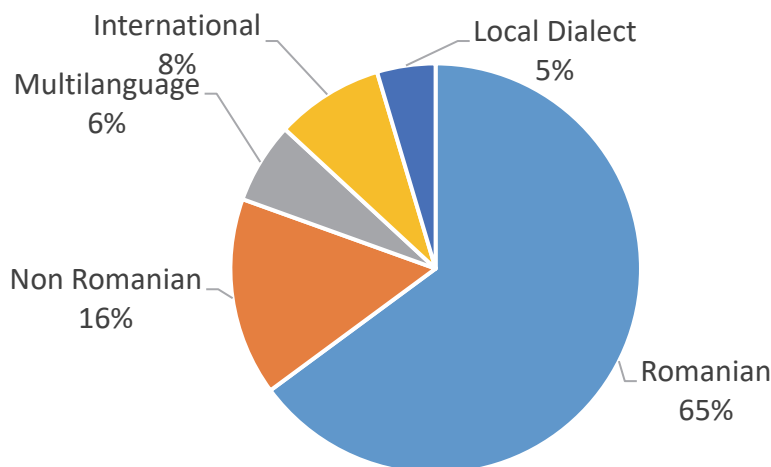


Figure 3. Distribution of languages used to mention medicinal plants among Romanians living in Ukraine.

Cross-border comparison of medicinal uses among Romanians living across the Bukovinian border

Among Romanians living in Romania, plant remedies were especially used for treating the digestive and respiratory systems, which correspond to emic treatments such as “good for the stomach” and “good for the liver” or “cough” and “cold”, respectively. General health (e.g. “panacea”, “healthy”, and “good for kids”) was equally important in both communities (Fig. 4). Among Ukrainian Romanians, the musculoskeletal and integumentary systems were also frequently mentioned, indicating a preference for external uses.

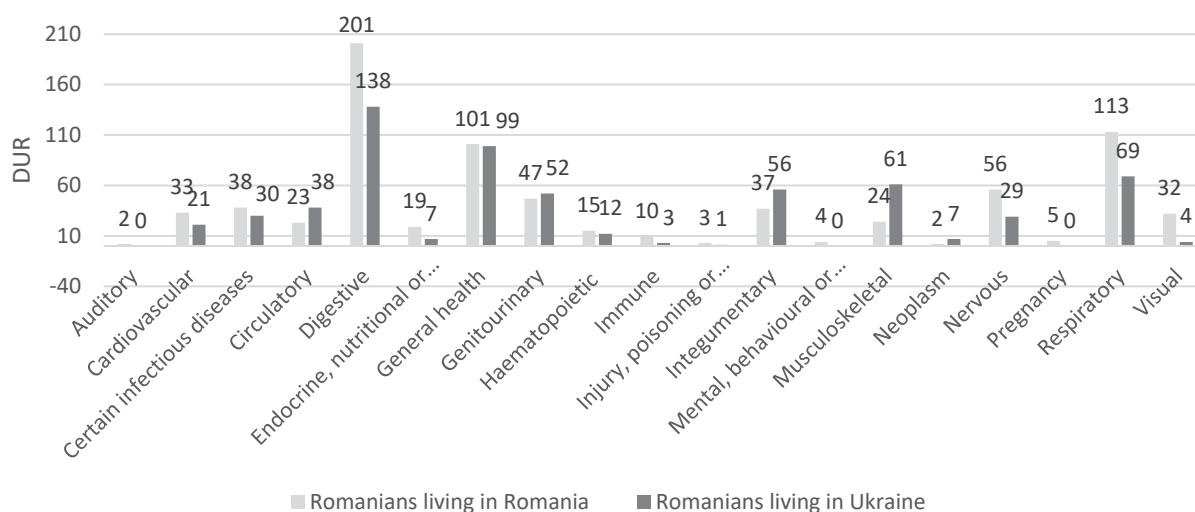


Figure 4. Cross-border comparison of treated systems among Romanians living in Romania (RR) and Ukraine (UR).

In both communities, tea was the most important medicinal preparation, as just water and the plants themselves are needed. In Romania Bukovina we met a 92-year-old woman who showed us the panacea tea she makes every year. She stored it in a big burlap bag along with 12 dried species, including the flowers of *Primula vulgaris*, *Primula elatior*, *Arnica montana*, *Calendula officinalis*, *Robinia pseudoacacia*, *Rosa rugosa*, and *Tilia cordata*, the stalks of *Prunus cerasus*, and the aerial parts of *Mentha* sp. pl., *Hypericum perforatum*, *Achillea millefolium*, and *Thymus serpyllum*.

In both areas of Bukovina, tea was sometimes sweetened with honey, especially for treating respiratory disorders. External uses, such as “locally applied” or “infused in alcohol and then locally applied”, as well as “raw” uses, were equally important across the border, while a bath preparation was considerably more important in Ukraine and syrup much more often mentioned in Romania.

Fifteen DUR related to 11 taxa were mentioned by at least 3 interviewees (10% of the sample) on both sides of the border. Both groups used *Achillea millefolium* for stomach

ailments and women's problems, and *Crataegus* sp. pl. for normalizing blood pressure and as good for the heart. Likewise, in both communities, *Equisetum* and *Zea mays* teas were used for treating the kidneys, *Lilium candidum* was infused in alcohol and locally applied to warts, and *Matricaria chamomilla* was used for body cleansing. The leaves of *Plantago major*, tea made from *Sambucus nigra* flowers, and the fruits of *Viburnum opulus* were used to treat cough among Romanians in both Romania and Ukraine. Teas made from *Mentha* sp. pl. and *Hypericum* sp. pl. were used as relaxants, while the roots of *Symphytum officinalis* were used to treat joint pain, and *Urtica dioica* was mentioned as a shampoo. Moreover, 4 use combinations were reported identically by at least 20% of the interviewees (6 individuals) and included a cultivated species, *Brassica oleracea*, locally applied for joint pain, and three wild species, *Urtica dioica* was used for blood cleansing, and *Carum carvi* and *Hypericum* sp. pl.. Specifically, the last two plants were mentioned by some 40% of the interviewees for treating stomach conditions.

Cross-cultural comparison of medicinal plant uses with Hutsuls living in Romanian and Ukrainian Bukovina

The results of our previous publication (Mattalia et al. 2020b) addressing a cross-border comparison among Hutsuls living in Romania and Ukraine showed that 18 taxa were common to the four communities (Fig. 5). Some uses were reported by all four Bukovinian communities across the border, including *Carum carvi* and *Hypericum* sp. pl. for stomach ailments, as well as boiled *Urtica dioica* for washing hair and for cleansing the blood. Some other species growing at higher altitudes (where Hutsuls live), such as *Arnica montana* and *Vaccinium myrtillus*, were not so common among Romanians. On the contrary, the shared species are widely available and respond to common and not-so-urgent needs such as stomach pain or hair washing.

In line with our findings among Romanians, Hutsuls living in Romania mentioned more plant-based remedies for the digestive system, while the musculoskeletal and integumentary systems were more often cited by Hutsuls living in Ukraine.

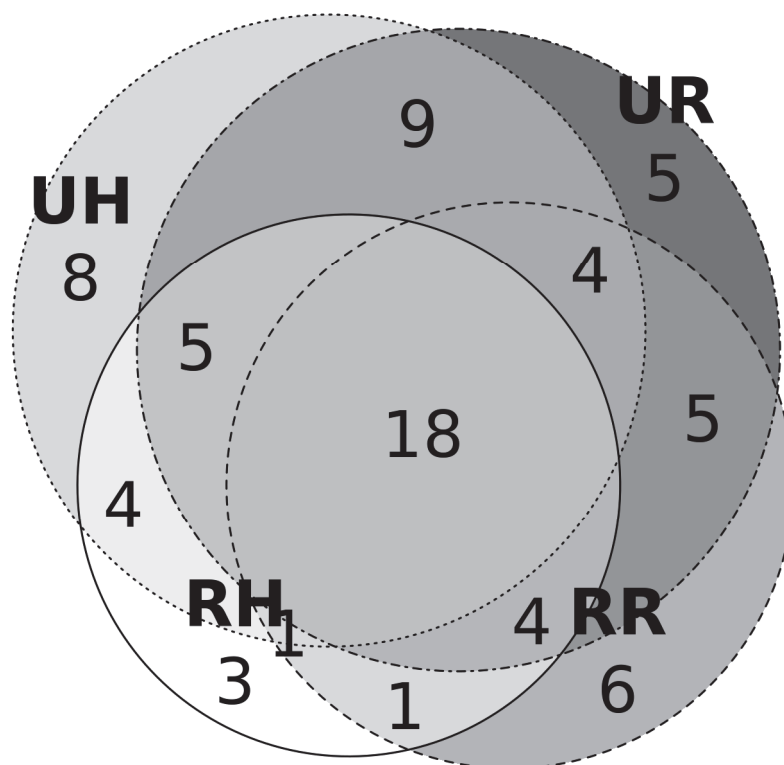


Figure 5. Proportional Venn diagram of taxa used by at least three interviewees in each community. RH = Hutsuls living in Romania, RR = Romanians living in Romania, UH = Hutsuls living in Ukraine, UR = Romanians living in Ukraine.

Cross-cultural comparison in Romanian Bukovina

Hutsuls and Romanians living in Romania shared 41 plant taxa used for medicinal purposes, while 22 were found only among Hutsuls and 32 only among Romanians, for a total of 91 taxa (Fig. 6). The JI between these two groups was 43, thus indicating less similarity than that between the two Romanian groups, i.e. those living in Romanian and Ukraine. The taxa shared exclusively among these two groups living in Romania included *Potentilla anserina*, *Prunus avium*, and *Salvia* sp. pl. However, they were mentioned by only one or two people. Indeed, considering those plant taxa mentioned by at least 3 interviewees, only one plant (*Abies alba*) was common to only these two groups, as the other 23 were also shared with the Ukrainian groups.

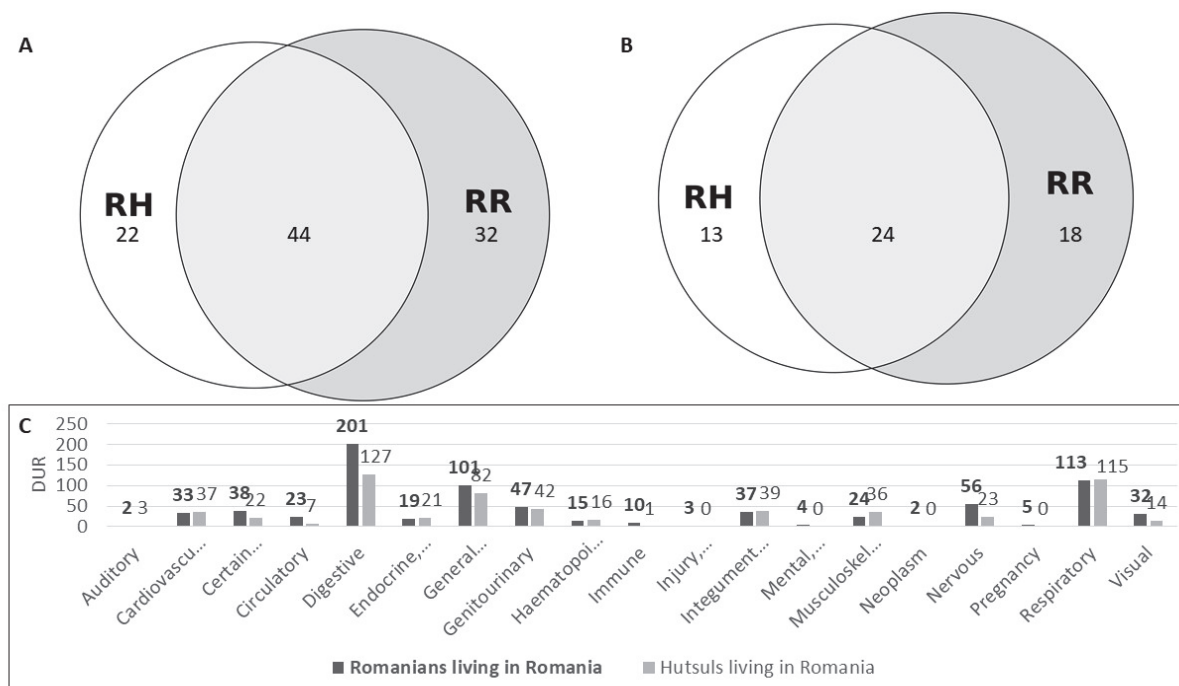


Figure 6. Proportional Venn diagram of taxa used by Hutsuls (RH) and Romanians (RR) living in Romania. Diagram A considers all taxa, while diagram B includes only taxa mentioned by at least 3 people. Diagram C shows the systems treated with plants among Romanians and Hutsuls living in Romania.

The analysis of the treated systems revealed that the digestive, circulatory, immune and nervous systems were more important among Romanians, while the musculoskeletal system was more important among Hutsuls. Plant-based remedies for the cardiovascular, genitourinary, integumentary and respiratory systems were equally reported in the two communities. In Romania, Hutsuls mentioned 22% fewer DUR than Romanians.

Regarding medicinal preparations, teas were less important among Romanians than Hutsuls (55% versus 67%), syrup was equally mentioned, whereas topical applications were more important among the latter group.

Of the top 5 most used plants within each community, only *Hypericum* sp. pl. was found in common (32 DUR among Hutsuls and 39 among Romanians). The most used plant taxa among Hutsuls included *Vaccinium myrtillus*, *Urtica dioica*, and *Tilia cordata*, while among Romanians they included *Achillea millefolium*, *Matricaria chamomilla*, and *Calendula officinalis*.

Cross-cultural comparison in Ukrainian Bukovina

Romanians and Hutsuls living in Ukrainian Bukovina mentioned 126 medicinal plant taxa, of which 65 were shared, 38 were found only among Hutsuls and 23 only among Romanians (Fig. 7). The related JI was 52. When considering only those taxa mentioned by at least three

interviewees, the overall numbers decreased significantly to 34 common plants, 16 found only among Hutsuls and 15 only among Romanians. However, the JI was nearly the same at 53.

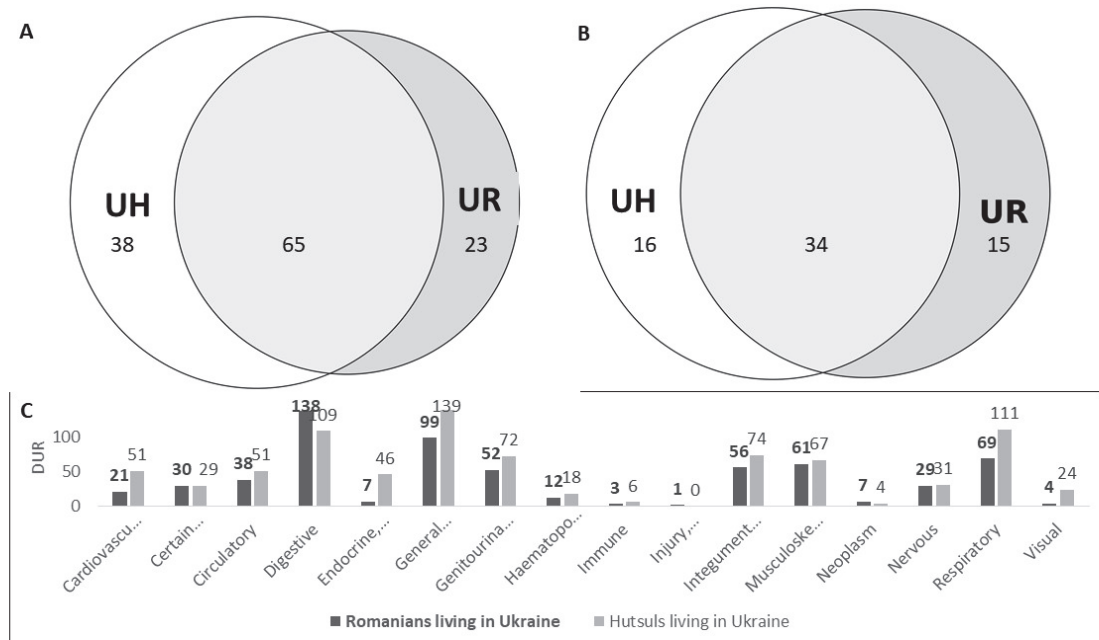


Figure 7. Proportional Venn diagram of taxa used by Hutsuls (UH) and Romanians (UR) living in Bukovina, Ukraine. Diagram A considers all taxa, while diagram B includes only taxa mentioned by at least 3 people. Diagram C shows the systems treated with plants among Romanians and Hutsuls living in Ukraine.

The most important treated systems were the digestive system among Romanians and the respiratory system, as well as the general health category, among Hutsuls. The cardiovascular, circulatory, endocrine, and visual systems were mentioned more often among Hutsuls than among Romanians. Indeed, Hutsuls reported a higher number of medicinal DUR.

Of the 5 top used plant taxa, three were found in common between the two communities (*Rubus idaeus*, *Hypericum* sp. pl., *Urtica dioica*). The most used plant among Hutsuls was *Vaccinium myrtillus*, which was not available to Romanians, whose most used species was *Matricaria chamomilla*.

Nine taxa were mentioned as used for medicinal purposes by at least three interviewees, all in Ukraine. They included two wild species (*Quercus* sp. pl., *Rumex patientia*) and seven that are cultivated (*Aesculus hippocastanum*, *Aloe vera*, *Anethum graveolens*, *Linum usitatissimum*, *Malus domestica*, *Melissa officinalis*, *Ribes nigrum*).

Knowledge transmission, a cross-border and cross-cultural analysis

We recorded seven sources of knowledge among Romanians in Romania. The most mentioned source was parents (41%), followed by grandparents (20%) and the elderly (15%), while written sources (including the category “school”, which is based on the response “biology books” provided by many interviewees) altogether accounted for 18% (Fig. 8). When considering the categories proposed by Van den Boog et al. (2017), vertical transmission was predominant, followed by written sources and oblique transmission.

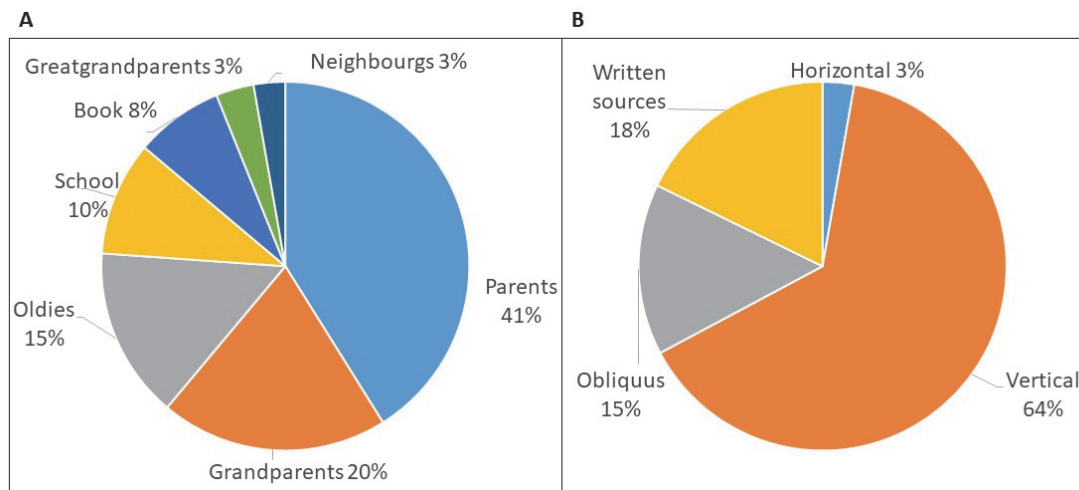


Figure 8. Knowledge transmission among Romanians living in Romania per emic category (A) and etic category adapted from Van den Boog et al. 2017 (B).

The comparison with the knowledge transmission strategies among Romanian Hutsuls revealed that the elderly played a major role among Hutsuls, while among Romanians written sources were more important. Indeed, some Romanian interviewees living in Straja reported that they have started reading books on medicinal plants since their retirement as they have had more spare time. They already knew most of the plants, but as they have had more free time, they have deepened their knowledge and started valuing the same plants for other purposes. For instance: “*I have read a lot about what they [the plants] are good for, because we knew the plants from our grandparents, as they used many plants for everything*” (female, born 1948). Another female interviewee also reported having learned from monastery books: “*I have learned from my parents, but there are a lot of books from monasteries, because there they use a lot [of plants]. They [the plants] have been used for long time, but newer recipes have appeared*” (female, born 1957).

Among Romanians living in Ukraine, we recorded nine sources of knowledge (Fig. 9). The most mentioned were parents, followed by grandparents (together representing vertical

knowledge and 61% of the total). Horizontal knowledge (neighbors and folk) accounted for 13%, while the elderly (oblique knowledge) constituted 5%. Written and visual sources represented 17% of the sources of knowledge.

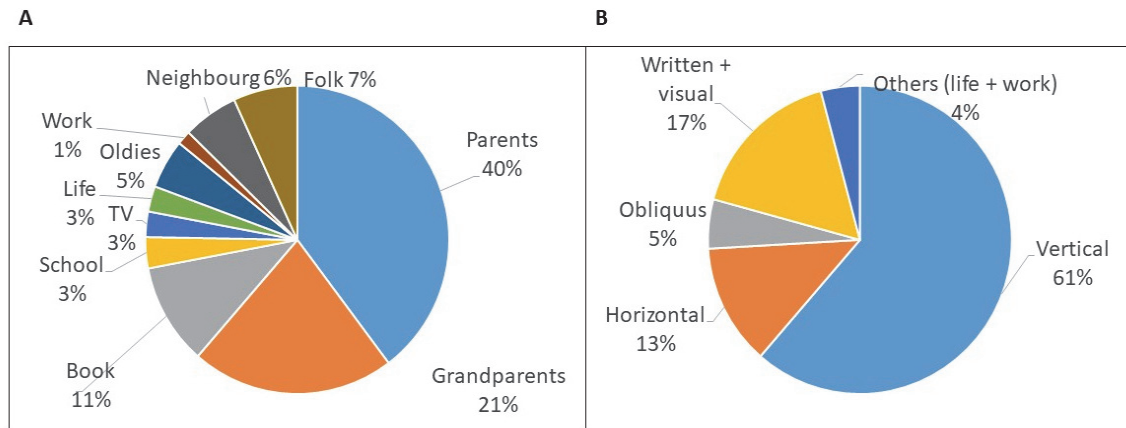


Figure 9. Knowledge transmission among Romanians living in Ukraine (n = 22; 8 interviews = source of knowledge unknown).

In present-day Ukraine, where culture and education are more accessible, owning a book is still a sign of social prestige, e.g. an interviewee told us *“I have learned from my parents; and from school, and a medicinal book. I have son who is a doctor, so I have a big book with all the plants and I have looked through it. There are many plants we still don’t know.”* During the socialist era, medicinal books were considered “scarce”, and they were very hard to buy. Also, in Ukraine it is a point of pride to own books and to have knowledge from books, as during Soviet times, only those who had an education and books had good jobs and salaries. In addition, as a post-Soviet phenomenon, local or “grandmother” knowledge has been criticized and even satirized.

However, an important role was also assigned to television: *“I have learned a lot from television. There are programs by Romanians [on Romanian TV], where doctors talk nicely [in an understandable way] about everything. Everything I told you is from books, from television, and from our life.”* While other Romanians living in Ukraine also mentioned the Romanian-language channel MEGA as a source of knowledge, the woman highlighted *“from our life”*, which was also mentioned by other interviewees with the expressions *“from myself”* or *“from my job”*. This concept was not mentioned among Romanians living in Romania, and may underline the importance of personal strength to overcome difficult times, such as those they probably experienced during the Soviet period and the socio-economic crises after the Soviet Union collapsed.

At the same time, among Romanians living in Ukraine, there were also some individuals who did not use books because “*we read books and we forget*”, which was also something mentioned among Hutsuls living in Romania. This attitude might be indicative of a rejection of that bibliophilic society in which books are a source of pride (found in the Ukrainian society), still coexist the perspective that “*there is no time for books*” and somehow vertically-transmitted knowledge is more important (found in the Romanian society). However, another factor may be the high reliance on “neighbor knowledge”, or oral knowledge transmitted horizontally.

A couple of women (born 1954 and 1960) when asked about medicinal plants declared “*I don't know. We bring them from Romania; in Italy they have such a good tea mixture against cancer. My sister-in-law brings them to me from Romania, Italy and America. Cancer is the hardest to treat.*” Interestingly, remedies for cancer were mentioned by an educated couple in Romania, while it was mentioned by six interviewees in Ukraine. All the interviewees reported having learned about cancer remedies recently. At the same time, the ongoing erosion process was also mentioned by another Romanian man (born 1935) in Ukrainian Bukovina: “*I don't know a lot, in the past the grandmas harvested [medicinal plants], but now not too much. You go to the shop and can get everything you need.*”

Comparing the ecological knowledge transmission of Hutsuls and Romanians living in Romania, we can observe that the elderly were more important among the former (42%) than the latter (15%), as their societal structure is likely different, more centered at the community level than the family level, due also in part to the higher degree of remoteness of their mountain dwellings. In addition, books and schools were less important sources of knowledge among Hutsuls, representing 2% and 3%, respectively (while they were 8% and 10% among Romanians).

Hutsuls and Romanians living in Ukrainian Bukovina shared a more similar way of transmitting ecological knowledge, yet the elderly were still more important among Hutsuls, as were parents and grandparents. Books and TV had the same importance in the two communities.

Discussion

Caveats of the study

Before discussing the results of the study we want to mention some caveats which may affect our interpretation and were considered in the following discussion. As the interviews in Romania were conducted with the help of facilitators, small details of the narratives could have been lost in translation. Interviews among Ukrainian Romanians were conducted partially in Romanian and partially in Ukrainian and Russian depending on the interviewer and also the language that the interviewee preferred. However, interviewees often responded in a mixture of the three languages which sometimes made it difficult to capture particulars of their narratives. Moreover, we conducted the linguistic analysis only among the interviews conducted in the Romanian language to avoid bias as a result of the vehicular languages of the interviews. Finally, the sample was not randomized, for which the representativeness of responses can be questioned. Romanian ethnomedicine across borders and cultures

Similarities and differences among Hutsuls and Romanians living in Bukovina

The JI of plant-based ethnomedicine reveals that the closest groups are Hutsuls and Romanians living in Ukraine (JI = 54 for taxa mentioned by at least 3 interviewees), followed by Romanians on both sides of the border (JI = 50), while Hutsuls and Romanians living in Romania have the least similarity (JI = 44). These results indicate a stronger cohesion between the two groups living in Ukraine. We found some plant taxa shared only by the two Ukrainian groups, possibly confirming our previous hypothesis regarding the presence of some pan-Soviet influence in the ethnobotany of Ukrainian Bukovina (Mattalia et al. 2020b). Among possible pan-Soviet elements, *Aesculus hippocastanus* infused in alcohol for relieving joint and rheumatic pain was also reported in Belarus (Sõukand et al. 2017a) and in Estonia (Sõukand and Kalle 2011), where an increase in use was also detected during Soviet times. Another plant common to other Eastern European countries is *Aloe* sp. pl., which is used especially for treating the skin but also the digestive system (Sõukand et al. 2017b). *Linum usitatissimum*, well-known in other areas of Eastern Europe for its ethnoveterinary properties (Kalle and Kaas 2020), is still sometimes used for the digestive system (Sõukand et al. 2017b). Finally, *Ribes nigrum* was mentioned on the Romanian side of the border, but only for food purposes, while in Ukraine it was also mentioned for treating

the circulatory and cardiovascular system, and it was reported for several other uses in Belarus (Sõukand et al. 2017b).

What language can reveal?

The linguistic analysis of the plant names mentioned among Romanians living in Ukraine reveals possible links to (written) sources of knowledge in Russian and/or Ukrainian. A prime example is provided by *Arctium lappa* (“lopukh”), which was mentioned among Romanians living in Ukraine for hair care. The same use was quite popular among Ukrainian Hutsuls, while on the Romanian side it was not mentioned at all. During Soviet times, *Arctium lappa* was actively used; there was even a State Standard for collection of its roots (Spravochnik 1983). In published books, it is explained that the roots help to have “beautiful and nice hair” (Reva and Lypovecky 1977), and that the oil extract is used for hair care (Kharchenko et al. 1971). However, the plant described by Komendar (1971) as good against hair loss, and also skin cancer, is *Arctium tomentosum*, not *Arctium lappa*, as the local name is the same. Similarly, *Avena sativa* and *Linum usitatissimum* were mentioned only among Hutsuls and Romanians living in Ukraine. *Avena sativa* was described as a source of vitamin B and for good appetite (Olijnuk et al., 1990). *Linum usitatissimum* is described as having anti-inflammatory properties (Kharchenko et al. 1971; Spravochnik 1983) and as remedy for gastric ulcer (Gammerman, et al. 1976). Another example is provided by *Ribes nigrum*, which is referred to with the non-Romanian name “smorodina”. In Soviet books, it is described as rich in vitamins, especially vitamin C, and as anti-diarrhea and diuretic remedies (Kharchenko et al. 1971; Karhut 1976; Mamchur 1986). Its use for treating circulatory and cardiovascular disorders was reported only in Ukraine (among both Romanians and Hutsuls). On the other side of the border, Romanians used this taxon only for food purposes, using the Romanian name “coacăze negre”. This term was also used among Romanians in Ukraine, but to treat general health issues. These examples suggest that language can serve as a vector, providing a clue to the possible roots of such uses.

In addition, the linguistic analysis highlighted the use of very specific terms among Romanians living in Ukraine, when compared with Romanians living in Romania. Indeed, they used such terms as “ghemoglobin” (hemoglobin), “pancratit” (pancreatitis), and “trombii” (thrombus), which were not used among Romanians living in Romania. The latter, on the contrary, used very common and basic medical terms, mainly referring to different parts of the body. Yet, Ukrainian Hutsuls mentioned several technicalisms including “cardiomagnil” [кардіомагніл], “gipertoniya” [гіпертонія], “cholesteryn” [холестерин],

“eczema” [екзема], “shlynkovo-kyshkovyj tract” [шЛУНКОВО-КИШКОВИЙ ТРАКТ], and “kokluysh” [коклюш]. This “technical” language may be a consequence of the implementation of the Soviet medical system which did not include general practitioners (Skultans 1999). Therefore, people themselves had to identify the doctor that could treat their disorders (Skultans 1999). This may have resulted in a deeper (Soviet) medicinal knowledge among Romanians living in Ukraine, as well as the popularization of medicinal books. Some of these technical medical terms also became common on television (Shultz and Rafferty 1990).

The divergent evolution of LEK held by Romanians living across the border

Another aspect revealed by the cross-border analysis involves the different knowledge transmission strategies of the different groups. In Romania, (mainly Romanian) interviewees mentioned using books to supplement the knowledge they acquired from their parents, and this occurred only in people who had an above-average education and the time afforded by retirement. Basically, while enjoying more free time, they reported reading and learning about new uses for the plants they had known since childhood. An interesting comment was made by a woman who highlighted local monasteries as a source of knowledge. Indeed, in Bukovina, Orthodox monasteries have been crucial elements of the cultural landscape for many centuries (Nicu and Stoleriu 2019). No one in Romania reported television or the internet as a source of their knowledge. Conversely, we may describe our Ukrainian interviewees as bibliophilic, as they often proudly reported having big medicinal books and using them when needed. Therefore, we can argue that the current medicinal knowledge held by Romanians living in Ukraine has an important scholarly knowledge component (*sensu* Mattalia et al. 2019) that originated in the Soviet context. Moreover, they mentioned having learned from television as well; but, in our presence they searched for answers on YouTube in the Russian language. Indeed, the era of television’s influence dates to the 1980s and 1990s when in Soviet countries many healers provided medical advice on various programs, and many people still believe them (Bogdanov 2020).

Interviewees appeared proud to be able to navigate different systems, which is similarly experienced in other spheres such as linguistics. Indeed, they declared not being able to speak any language properly as they do not speak “român curat”, or correct Romanian (literally: clean Romanian, sometimes also referred to as Moldovenesc - local Romanian written with Cyrillic characters), and they speak only incorrect Russian and few words of Ukrainian. Yet, this linguistic duality is currently seen as an advantage for both obtaining a Romanian (thus

European Union) passport and importing contraband cigarettes into Romania, which is a profitable job in the area (Cassidy 2017).

Considering that before border creation the two groups of Romanians possessed homogeneous LEK, the different political and therefore socio-economic trajectories experienced by Romanians on the two sides of the border may have shaped the current LEK. On the one hand, we could not find the main drivers of LEK change among Romanians living in Romania as the area was very limitedly touched by the *sistematizarea* policies [rural systematization] implemented by Ceaușescu because of the resistance of local inhabitants to collectivization, the limited interactions of the population with the communist regime, and the unfavorable geographical conditions (Olaru 2019). On the other hand, after border creation and the consequent annexation of Northern Bukovina to the USSR, Romanians living in Ukraine underwent a process of assimilation into Soviet culture (or Sovietization). Despite the fact that in the study area the Romanian language has prevailed for a long time in both schools and churches (considered the most important local authorities), villagers underwent a process of indirect assimilation into Russian culture, also through the adoption of the Cyrillic alphabet to write the Romanian language (Popescu 1994). With regard to medicinal knowledge, the assimilation process could have also been fostered by the evolution of the Northern Bukovinian health system during and after the collapse of the USSR in 1991. According to the historical analysis proposed by Lekhan et al. (2010), during the Soviet era, the medical system provided universal access to health services and pharmaceutical products were well-distributed at the local level. Yet, despite their wide availability, the quality of such pharmaceuticals were not high as medical guidance was mostly based on “expert” advice rather than on evidence-based medicine (Danichevski et al. 2008; Rechel et al. 2011). Therefore, several medical treatments were ineffective, despite the country having one of the highest numbers of physicians per capita (Rechel et al. 2011; Cromley and Craumer 1990). The creation of the independent state of Ukraine and the hard shift from a communist to a market economy resulted in a decline in population health, as well as a high cost of medical supplies (Lekhan et al. 2010).

This health context may have promoted the use of local resources, especially in the economic crisis of the 1990s, when many people could read Russian (and the books published in this language) and medicinal products were rare and expensive. Yet, as soon as the economic situation improved, Romanians living in Ukraine, in order to make a profit from their ability to navigate multilinguistic and multicultural systems, started emigrating and obtaining

medicines from other countries as well as obtaining remittances to be able to buy from local pharmacies.

The introduction of Soviet elements into the local Romanian (and formerly Austro-Hungarian) culture, also promoted the ability of local inhabitants to obtain access to Russian books as medicinal sources of knowledge, thus introducing some global (pan-Soviet) elements into the local (Romanian) ethnomedicine. This new local knowledge resulted in the current higher number of plant taxa used for medicinal purposes, but in their less consistent use (compared to Romanians living in Romania).

What emerges from this analysis is the inner border of Romanians living in Ukraine, e.g. a cultural border also found in other communities living in the proximity of political borders (e.g. Mattalia et al. 2020a). Indeed, they hold Ukrainian passports, but they mostly share only the Soviet era with Ukrainians, as only younger generations can speak some Ukrainian. As they clearly explained to us, they are Romanians who happened to be included in the Soviet Union. Therefore, while sharing with Ukrainians some (pan-) Soviet characteristics such as the love of books and the consequent tendency to knowledge standardization, Romanians living in Ukraine also share some Romanian elements as they watch Romanian television and in a great majority of cases their parents were born in a Romanian environment. Therefore, paraphrasing Marsico (2016), they belong to the two sides, without being defined by either of the two parts. Indeed, Romanians living in Ukraine are an interesting case of ‘unbelongingness’. This is probably the result of a forced assimilation into the dominant Soviet culture, and the consequent loss of some pieces of Romanian (formerly Austro-Hungarian) identity. However, the centripetal forces of the USSR did not allow interstices and expanded homogeneously to most of its territories, despite the presence of ethnolinguistic diversity. This resulted in a forced “alphabetization” of the last “Latin” island of Romanians into the Slavic world which had been developed for centuries in other trajectories. This also occurred through precise strategies of science popularization with a few books regarding medicinal plants published several times (for a possible list see Mattalia et al. 2020b).

Conclusions

Overall, the results reveal four main findings.

The communities living in Ukraine share more LEK than the ones living in Romania. We can argue that for about 50 years (1940-1991) Northern Bukovina belonged to a larger political system, the USSR, which uniformly delivered health services, equally affecting Hutsul and Romanian medicinal knowledge corpora by integrating homogeneous pan-Soviet (global) elements, as indicated by several plant uses common among the groups living in Ukraine, into the local corpus of ethnomedicinal knowledge, thus creating a glocal ethnomedicinal corpus of knowledge. In addition, Romanians of Northern Bukovina appear to use a smaller number of medicinal plants due to their movement to other European countries where they (proudly) buy foreign medicinal products.

The more divergent LEK of Hutsuls and Romanians living in Romania who have been living relatively independently from one another, due to the lack of any recent strong centralization force in the valley, as Ceaușescu's policies do not appear to have impacted LEK because of their limited implementation in the Bukovinian area. The similarities among the two Romanian communities could instead be due to common historical roots and language, and therefore possible common sources of knowledge (e.g. Romanian books and television).

From the perspective of divergent trajectories of herbal knowledge, we observed substantial differences in LEK transmission across the border. The main difference concerns the use of written and visual sources, which is quite limited among Romanians and Hutsuls living in Romania (where vertical transmission prevails) but rather important among the bibliophilic communities living in Ukrainian Bukovina.

Finally, we found that in multilanguage communities (such as that of Romanians living in Ukraine), an analysis of plant names can provide important clues to trace the possible origin of such medicinal uses.

Further research is needed to more thoroughly explore the link between wild plants and the way people refer to them in order to understand the implemented strategies of LEK transmission in multicultural contexts.

Authors' Contributions

RS conceptualized the research; GM, NS, AG conducted fieldwork; GM analysed the data; NS conducted archival literature research on plants in Soviet medicinal books; and GM drafted the manuscript. All authors contributed to the writing of the manuscript, and read and approved it.

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Chapter 3: Hutsuls’ perceptions of forests and uses of forest resource in Ukrainian and Romanian Bukovina

Introduction

Cultural, socio-economic and political systems in which people live largely contribute to shaping how they perceive and relate to their surrounding environment (e.g., Cuni-Sanchez et al. 2019, Sunderland et al. 2014). Furthermore, the way in which people view the environment reflects different systems of valuation (Pascual et al. 2017). For instance, economists suggest that the monetary value of forests and forest resources influences how people relate to the forest, for which they have developed methods to calculate the economic benefit of forests (e.g., Friedrich et al. 2019, Hanewinkel et al. 2013). In contrast, there is an increasing awareness that economic estimates do not fully capture the manner in which local communities value their forest (Ritter and Dauksta, 2006). This is so because forests contribute to local livelihoods in many ways beyond material provision, and thus many local communities across the world have developed strong cultural and spiritual ties to them (Cooper et al. 2016, Guadilla-Saez et al. 2019, Katila et al. 2014). Beyond material provision, local communities value forests because of the learning opportunities, inspiration, and the physical and psychological experiences they provide, and because they support their identities (Diaz et al. 2018).

Despite the importance of culture in understanding forest use and management, people’s perceptions of forests have been only partially explored (e.g., Alessa et al. 2008, Mikusiński and Niedziałkowski 2020, O’Brien 2006, Solomon et al. 2018). In the European context in particular, research has addressed people’s opinions on specific topics related to forests, such as the introduction of invasive species (Lundberg 2010), intensive forestry (Hemström et al. 2014) and the implementation of climate change adaptation strategies (Lenart and Jones 2014). However, few works have examined local communities’ perceptions of forests per se (see Paletto et al. 2013, Mikusiński and Niedziałkowski, 2020 for exceptions). In a study conducted two decades ago, Jeanrenaud (2001) pointed out that factors such as the globalisation of timber markets, the intensification of forestry practices, the changing

policies and patterns of forest governance, and the disruption of traditional values and beliefs generated profound changes affecting the people-forest relations in Europe. This has been confirmed in subsequent studies. In a study in eight European countries, Elands et al. (2004) found that the opinions of rural residents regarding forests were affected by the shift of employment opportunities from primary (e.g., agriculture, natural resource exploitation) to secondary and tertiary sectors. Other studies addressed the perceptions of natural forest regrowth by communities living in Southern Europe (Frei et al. 2020) or of forest values of small German forest owners (Joa and Schraml 2020). To continue this line of work, here we examine the relationship between local people's perceptions of forests and the use of forest resources.

The study focuses on the Carpathian Mountains, the largest temperate forest ecosystem in Europe, which has been mostly managed for centuries (Griffiths et al. 2014), but of which little is known regarding the perceptions of local communities towards the forest. The few studies on the topic suggest that local perceptions are linked to environmental changes. For instance, in Romania, a study of teachers' perceptions of forests revealed that local woodlands had undergone major negative changes (including clearances, destruction and degradation) driven by political factors (Dulamă et al. 2017). Similarly, another study found that local Ukrainian communities considered that illegal harvesting was the major threat to the economic and social development of forest areas (Chernyavskyy et al. 2011a).

The Carpathian Mountains are a transnational space, home to numerous ethnic groups and local communities (Filep 2009), representing an important European biocultural refugium (Angelstam et al. 2013, Barthel et al. 2013b), as they are simultaneously home to high cultural and biological diversity resulting from the centuries-long interactions of local communities with the surrounding mountain environment (Melnykovich and Soloviy, 2014, Skalník 1979). However, this connectedness is increasingly diminishing as local communities adopt new lifestyles in a context of shifting political and economic conditions (Balázs et al. 2019).

The Carpathians are ideal for studying an important aspect often neglected by research on forest perceptions: the role of national policies in shaping local perceptions of forests and their potential impacts on forest resource use. National borders often represent biodiversity reservoirs (Liu et al. 2020) and are crucial for ecosystem conservation boundaries (Dallimer and Strange 2015). Indeed, over the centuries, Carpathian forests have been shaped by different governance systems, from the Austro-Hungarian Empire to the recent regulations

of the European Union (Knorn 2012)). Carpathian forests had a common management until the 1940s, when forests located in Northern and Southern Bukovina started divergent management under the Soviet Union and the Socialist Republic of Romania first, and then, at the beginning of the 1990s, under the Independent Ukraine and Romania. Since the split of Bukovina, there have been very little interactions between the populations residing in the two halves of the Bukovina, for which differences in how these populations relate to forest might have appeared. Understanding and detecting changes in the way local communities relate to forests around political borders may be crucial for promoting transnational policies able to preserve and promote invaluable living biocultural landscapes.

In this work, the geopolitical diversity of the Carpathians is used to assess the potential effect of state policies on local people's perceptions of the forest and the use of forest resources. The specific aims of this work are to detect similarities and differences regarding 1) local perceptions, and 2) uses of forest resources between Southern Bukovinian (SB) and Northern Bukovinian (NB) Hutsuls, living under the same political entity until the 1940s and currently split between Romania (Southern Bukovina) and Ukraine (Northern Bukovina). In the last section of this work, we discuss the implications of our results for making current forest management plans more inclusive of the perspectives of the traditional communities, such as Hutsuls.

The case study

Bukovina, a multicultural region of the North-Eastern Carpathians (Fisher and Röger 2019), offers an interesting case to analyse the effects of borders in forest perceptions, as its partition between two states in 1940 has resulted in uneven socio-economic changes across the border, with potential consequences on how forests are perceived and used. Bukovina is crossed by the Carpathian Mountains which traverse Eastern Europe for over 1500 km. Figure 1 summarizes the complex geopolitical history of Bukovina, a duchy of the Austro-Hungarian Empire until 1918, when it was included in the Greater Romania. In the 1940s Bukovina was split with the Northern part becoming part of the Soviet Union and the Southern part that soon was included into the Socialist Republic of Romania. Then, in 1991, when the Soviet Union collapsed, Northern Bukovina integrated the Independent Ukraine. In Southern Bukovina, the Revolution occurred in December 1989 and Romania joined the European Union in 2007.

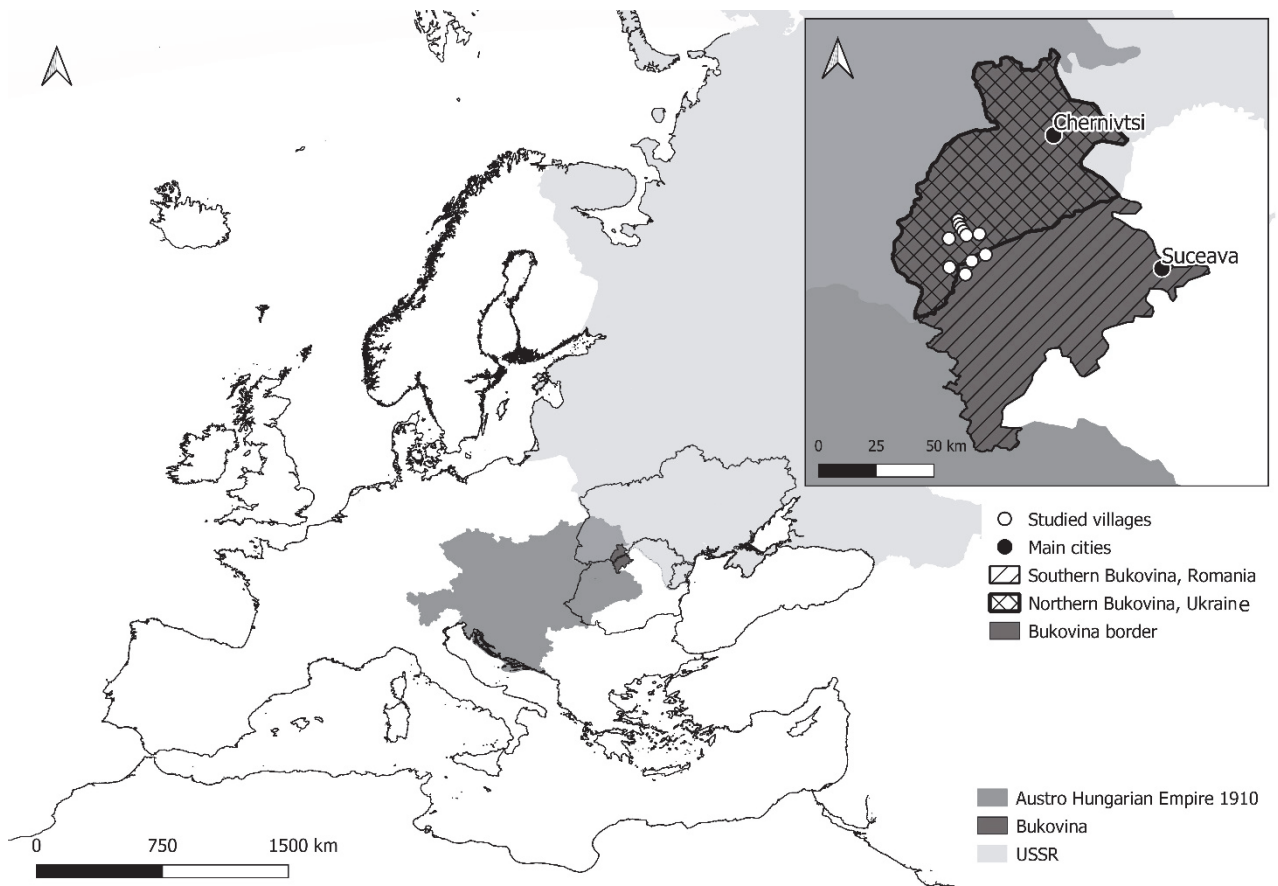


Figure 1. Historical changes of the Bukovinian territories (1775-1991) and current map of Bukovina.

Among the several ethnic groups living in Bukovina, the Hutsul have developed a specific relationship with the forest, being especially skilled in wood harvesting and processing (Bocharnikov 2012, Czubiński 2014, Figlus 2009) While they cannot be considered as indigenous peoples (see Sajeve et al. 2019 and the references included), they are one of the traditional peoples in Europe with a long history of interaction with the environment. Although we lack precise historical information about Hutsul settling it is generally believed that Hutsuls settled in the Carpathian highlands between the 14th and 18th centuries, where they established themselves at an altitude between 500 and 1000 m asl, mainly subsisting on pastoral activities (Figlus 2009, Hrabovetsky 1982; Lavruk 2005). Despite the political separation, the Hutsuls maintain a similar cultural identity on both sides of the border. Hutsuls are largely devoted to small-scale animal husbandry (mainly cows and sheep) and crop farming, along with the harvest of edible and medicinal forest products. In addition, young men are occasionally hired for forest activities or work in private forests on the Romanian side.

Amato (2021) reported that the term ‘Hutsul’ has its roots in words meaning ‘bandit’ and ‘thief’, also commonly used to refer to other pastoral societies, probably in relation to the practice to graze other’s land (Aime et al. 2001). However, Hutsuls are better known as the ‘wild people of the forest’, as they have a long history of dependence on forest resources from both an economic and a cultural perspective (Drăgușanul 2011, Saghin et al. 2017),

Hutsuls speak an unwritten language. In addition, Hutsuls living in Romania also speak Romanian, and Hutsuls living in Ukraine speak Ukrainian, their respective languages of school instruction.

Hutsuls are defined not only by their language, but also by their music and its songs, clothes (which enables identification of the village of origin based on distinctive features), and handicrafts (woodcarving, painted eggs called ‘Pysanka’, specific Kosiv Hutsul ceramics which included into UNESCO List of the Intangible Cultural Heritage of Humanity and handmade national embroidered clothes) (Haratyk 2014). Traditional handicrafts play an important role in the forming of identity and is influenced by local flora and fauna and human interconnections with surrounding nature. Among the agricultural activities which mostly contributed to the Hutsul identity, there is the Hutsul horse breed, a very strong equine that plays an important role in both forestry and hay-making activities.

The current population in the Hutsul area is approximately 28 700 people, about 7300 in Romania (based on our own estimations due to the lack of an accurate census, see Saghin et al. 2017) and about 21 400 in Ukraine (based on the National Ukrainian Census 2001). In this article, the names of the countries (Romania and Ukraine) are used only to indicate a geographical location, while the abbreviations NB (Northern Bukovina, currently in Ukraine) and SB (Southern Bukovina, currently in Romania) are used to distinguish Hutsuls living respectively in Ukraine and in Romania.

Forests dominate the Bukovinian Carpathians landscapes. Forests in the study area mainly consist of *Picea abies* (L.) H. Karst. (65%), *Fagus sylvatica* L. (15%), and *Abies alba* Mill. (18%), with some individuals of *Quercus* sp. pl., *Carpinus betulus* L. and *Alnus glutinosa* (L.) Gaertn (2%).

However, the complex geopolitical history of Bukovina has also complicated the history of forest management, including land ownership and access. Figure 2 illustrates the main impacts of socio-political changes on the Bukovinian forests over the last 250 years.

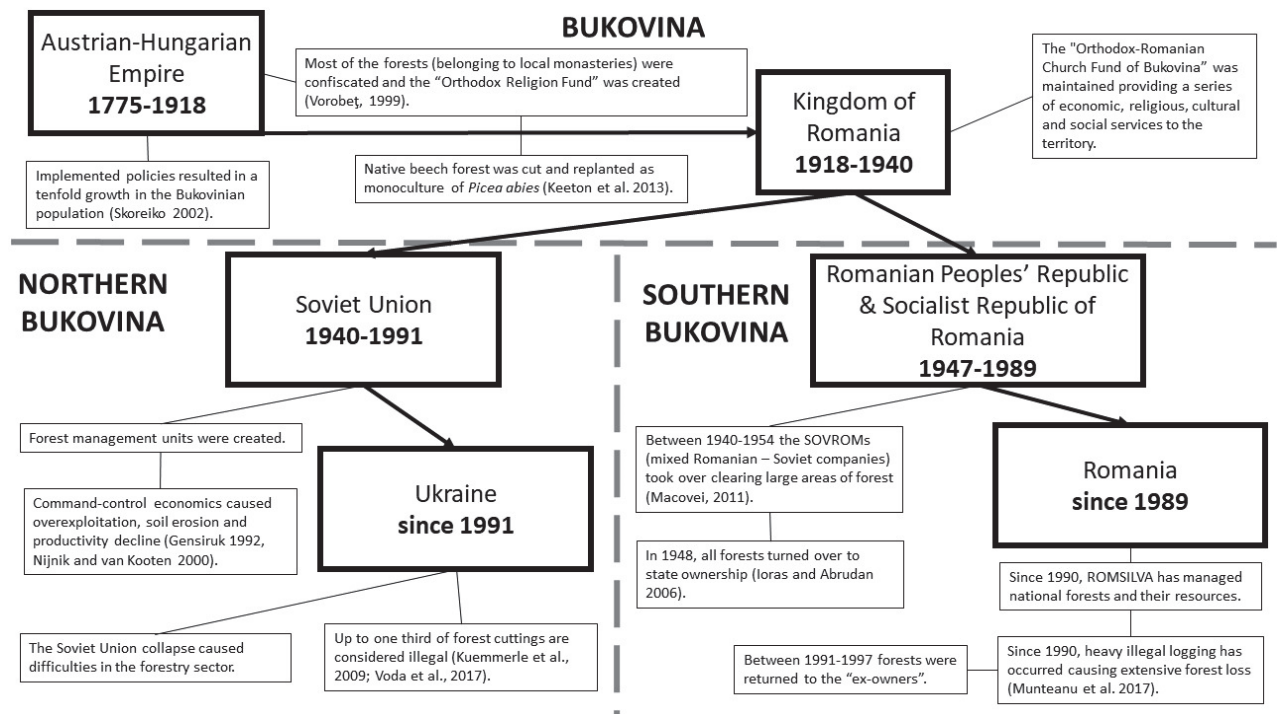


Figure 2. Impact of socio-political changes since the 18th century on land ownership and access to forests by Hutsul communities in Bukovina.

Bukovinian forests are highly altered and disturbed landscapes as anthropogenic impacts on vegetation have been significant since the 18th century (Solodkyi 2012). Currently the forest of the study area are state-owned on the Ukrainian side where the state forestry enterprise 'Putyla Forestry' harvests 60 000 m³ of logs annually in a forested area of 32 114 ha (see appendix table 1). A timber processing facility in the area processes 150 000 m³ of wood annually, mostly for export (State Forest Fund of Ukraine 2018). In the area, Cheremosky National Nature Park was founded in 2011. On the Romanian side, 85% of the forest area is owned by the State, under the control of the National Forest Administration (ROMSILVA), while around 20% is owned by private actors, including local Hutsuls inhabitants. The national forest is locally administrated by forestry enterprises of Falcau and Brodina which manage over 21 800 ha in the municipalities of Brodina, Ulma and Izvoarele Sucevei. In the area there is a special avifaunal protection area named Obcina Feredeului. On both sides of the border, it is currently possible to harvest forest food and medicinal plants for personal consumption in the state forests, although official authorizations are required for gathering with commercial purposes. Firewood collection is forbidden. In the Romanian private forests, owners can forbid the harvest of forest products. Hutsuls have, therefore, the right to harvest forest products such as berries, medicinal herbs or mushrooms in any state-owned forest for personal consumption, while they can also harvest firewood only from their own

forest (if owned, in Romania). Similarly to Ukraine, collection of berries and mushrooms for commercial purposes are allowed with special permit, called ‘ticket’, which can be obtained from state forestry enterprise. This also applies to church owned forests which are considered private. In Romania the forest use is regulated by the order 767 of the ministry of waters and forests, which was promulgated in summer 2018.

In Romania, forest management plans last for 10 years and are compulsory for all forest larger than 10 ha (Bouriaud et al. 2013, Nichiforel et al. 2020). These plans, based on technical prescriptions, define the amount of timber which can be harvested and the owner cannot subsequently change the management goals (Bouriaud et al. 2013). National forest administration or licensed foresters are responsible to select, mark and record trees to be harvested (Nichiforel et al. 2020).

As in Romania, Ukrainian forestry enterprises manage forest following a ten-year management plan, developed by the independent planning and management organization ‘Ukrainian State Project Forest Management Production Association VO ‘Ukrderzhlisproekt’. These management plans include qualitative and quantitative characteristics of each forest patch, planning management activities and harvesting details. The management plan takes into account the specific economic and ecological conditions of each area (Shparyk, 2014).

Methods

Data collection

Data were collected within the framework of the ERC-funded project, DiGe, which aims to understand the mechanisms of change in ethnobotanical knowledge experienced by small ethnic groups under centralized governance of the Soviet Union and in bordering countries (see Mattalia et al. 2020b, Stryamets et al. 2021). To assess local perceptions of forests and uses of forest resources, in summer 2019 open-ended interviews were conducted with Hutsuls from Bukovina living on both sides of the Romanian-Ukrainian border.

Data were collected from two different samples. First, to capture people’s perception of and relation to forests, 29 participants were selected using convenient sampling initially and later the snowball sampling technique (Noy 2008). Fifteen open-ended interviews were conducted in the municipalities of Brodina, Ulma and Izvoarele Sucevei (Suceava, NE Romania) and 14 in the municipality of Putyla (Chernivtsi, SW Ukraine). Open-ended interviews were

more suitable for understanding the perceptions related to the forest. Second, semi-structured interviews and participant observation were used to collect information about forest resource use (see Mattalia et al. 2020b, for the ethnobotanical description of food and medicinal plants used by Hutsuls). This was considered the most suitable method because it helped the interviewee to elicit plants and uses. Purposive sampling was employed to select 30 Southern Bukovina (SB, in Romania) and 31 Northern Bukovina (NB, in Ukraine) Hutsuls locally recognized as knowledgeable. Interviews addressed uses of edible and medicinal forest plants, parts used, preparation mode and medicinal purposes. The interviews were conducted in Romanian and Ukrainian. Voucher specimens were gathered with interviewees, also noting plant species habitat. For the purpose of this work, a forest taxon is defined as a plant taxon which grows in the forest or at the edge of the forest according to the perception of the interviewees.

In Romania, the same people were interviewed for the two parts of this research, while in Ukraine there was only partial overlap between participants, as the research was carried out during two different visits (2018-2019). Data were collected following the ethical guidelines prescribed by the International Society of Ethnobiology (2006). The data collection protocol was approved by the Ethical Committee of Ca' Foscari University of Venice.

Data analysis

Data from open-ended interviews were used to assess how Hutsuls on both sides of the border perceive forests. The comparison of responses enabled us to identify 1) the perception of the forest by both groups and whether they are common to both the groups across the border or not, 2) which forest plants are considered edible by one or both groups, 3) which food preparations are common to both communities or only reported on one side of the border, and 4) what proportion of forest food and medicinal plant taxa are used in each community. Transcripts and notes from interviews were manually organized and coded (classified), in Microsoft Excel, according to the main topic raised by the interviewees. An inductive approach was used to identify the most relevant topics appearing in narratives in relation to forest perceptions. The first and last authors identified keywords according to the overlapping meaning of the textual citations. To minimize language biases, expressions with similar meaning were combined under the same keywords. One narrative could include several keywords and therefore could be classified in different categories. The categories were organized into three main topics: forest benefits, observed ecological changes, and

drivers of change. When reporting citations, the area (NB for Northern Bukovina and SB for Southern Bukovina) is indicated along with the gender of the interviewee and their year of birth.

To assess people’s use of forest resources, an ethnobotanical database was created in Excel. The database included the scientific name, parts used, and preparation mode reported by SB and NB Hutsuls separately. Each line of the database is considered a Detailed Use Report (DUR) which includes all details of a plant species use. Information on the same taxon from each side of the border was combined to identify similarities and differences. Specifically, for medicinal plants cited, a list was generated and the emic medicinal use was added, which was classified according to the etic categories of ICD-11 (World Health Organization 2018).

Results

Hutsul forest perceptions

Hutsul narratives on forests resulted in 59 keywords organized into three main topics: forest benefits, observed ecological changes and drivers of change (Table 1).

Table 1. Topics and categories of the narratives related to forests among Hutsul interviewees living in Northern (NB) and Southern Bukovina (SB)

Topic	Category		SB Hutsuls (RO)	NB Hutsuls (UA)
Forest benefits	Economic benefits	Contribution to the local economy	27	22
		Contribution to health and food security	10	12
	Cultural benefits		9	9
	Aesthetic benefits		1	3
Observed ecological changes	Changes affecting forest food and medicinal plants and fungi		6	14
	Changes affecting forest tree species		4	8
Drivers of change	Management changes	Changes in forestry activities and intensity	22	13
		Changes in tools and techniques	9	4

	Changes in regulations (related to political changes as well)	8	4
	Changes in knowledge	0	4
	Climate change	7	4
	Political changes	8	3
	Socio-economic changes	2	4

Forest benefits

Many narratives included references to forest benefits, or the many ways in which forests contribute to local people's livelihoods. Specifically, in the narratives provided by both Southern Bukovinian (SB) and Northern Bukovinian (NB) Hutsuls, we found 22 different keywords that referred to economic, aesthetic and cultural benefits provided by forests (Table 1). More than half (12) of the keywords referring to forest benefits were shared by Hutsuls on both sides of the current Romanian-Ukrainian border. In particular, both communities agreed on the importance of gathering forest resources, especially berries, edible mushrooms and arnica, as an income-generating strategy. For instance, a middle-aged Hutsul woman stated "*People who do not have a lot of land go to harvest (mushrooms). They earn money from this activity. They harvest all summer long*" (SB woman, 1972). Respondents, however, also referred to some problems derived from the commercialization of forest resources, including overharvesting. For example, SB Hutsuls consider that the commercialization of forest products is not very profitable: "*It is possible to sell mushrooms. The 'colectorul' (a person who directly buys from locals to resell to factories) comes and buys them. He earns a lot of money because he buys at 20 lei and sells at 40-50 in Campulung*" (SB man, 1978). On the other side of the border, an interviewee argued that "*There are no more blueberries because the zahotivelniki [заготівельники] (people who buy forest products from locals) are buying too many blueberries and there are no more in the forests*" (NB woman, 1978). Several NB interviewees pointed out the need for intensive harvesting of forest products (especially blueberries) to earn cash, for which some people even collect green fruits.

The importance of forests and forest products (including timber, wild food plants, medicinal plants and mushrooms) for nutrition and health was repeatedly mentioned in both Hutsul communities. Hutsuls recognise the singularity and authenticity of their forest products,

which they consider as having curative power. Indeed, most of the interviewees showed a sense of pride for their territory, highlighting the deliciousness of its food and the strong curative power of its medicinal plants.

Cultural benefits appearing in narratives from interviewees on both sides of the border highlight the similar views of the two Hutsul communities on this topic. Thus, respondents from both communities mentioned culturally-based appreciation for forests and forest resources, such as the tastiness and high quality of local forest products. For instance, a middle-aged SB woman exclaimed: “*Boletus! Look! How good! What a scent! What a taste!*” Cultural appreciation was also highlighted in the expression of negative feelings towards forest destruction. Several SB Hutsul respondents used the word *distrusă* - ‘destroyed’ to refer to the forest, also in the context of human-induced changes. “*Forest is not managed, forest is destroyed,*” expressed a group of elders, judging the current process of exploitation. A NB woman (1972) proposed making more careful use of forest resources, including reserving the use of mushrooms only for special occasions such as Holy Evening, to reduce gathering impact. A NB woman (1975) reported: “*My heart aches. We have such a factory for medicinal plants and they pull up everything in a row in such a way that makes my heart ache*”.

Finally, aesthetic benefits were especially reported by NB Hutsuls. These benefits particularly refer to the “such a good air” (which they connect to the presence of the forest), but also to the pleasure of walking in the forest and to their satisfaction with the landscape. For example, a SB woman simply stated that the place where she resides (i.e., Upper Suceava valley) is “*Such a good place to live in!*”

Observed ecological changes

A predominant topic of Hutsul forest narratives involves the many ecological changes observed in local forests, and how these changes affect both the forests themselves and their resources (Table 1). NB Hutsuls generally summarised the changes observed by saying that “*The forest is no longer healthy*” (NB woman, 1965). A SB Hutsul noticed that “*The forest is young. Once the forest was old, but the forest is now clear cut. Everything is cut, so it remains empty*” (SB man, 1934).

Moreover, changes have also been noticed in specific elements of the forests: “*The forests have changed. The forests have a lot of clear-cuts now, so there are no more blueberries. Instead, raspberries are growing in the clear-cuts*” (NB woman, 1965). Along the same

lines, in Ukraine a peculiar change in moss was reported by a woman: “*There are no mushrooms in the forest this year. There is a lot of moss, and trees are getting rotten because it was too rainy. Normally, only hundred-year-old trees get moss*” (NB woman, 1964). Another interviewee observed that ecological changes resulted in a shift in the mushroom harvesting season. During an interview in the month of July, an informant noted that “*Normally, they should have appeared already. There used to be plenty. They used to harvest so many mushrooms! In other rainy seasons like this, it was full. But now I don’t see them*” (SB woman, 1982). Conversely, on the Ukrainian side of the border one interviewee mentioned “*Everything comes now earlier*” (NB man, 1972).

Drivers of change

Four different drivers of change dominated interviewee narratives: management, climatic, political and socio-economic drivers (Table 1). Among SB Hutsuls, the most frequently mentioned drivers of change refer to changes in the way the forest is managed. Climate change was also mentioned as a more recent driver of change.

Before presenting the changes in forest management, it is important to note that these are strongly related to political changes. For instance, the transition from the Soviet Union to independent Ukraine was reported as a shift from a long-term management model to an “*economy-driven only*” management model (NB man, 1965). Political changes were especially reported in Romania, where several interviewees noted that forest resources have been managed in a different way *după Revoluție*, i.e., after the 1989 Revolution.

Four different aspects of forest management were mentioned as having shaped the current status of forests: changes in forestry activities, changes in tools and techniques used for forest management, changes in forest regulations, and changes in local knowledge regarding the forest. First, informants reported changes in forestry activities and the intensity of forest management. “*The forest has been cut*” was the most common observation in Romania, reflecting the extreme intensity of forest management. On both sides of the border, respondents stressed the impact of such intense management on forest resources. According to informants, cleaning the forest by cutting small areas was a better technique than clearing large plots, as it is done now. This is so because, when large plots are cut, berries and mushrooms cannot grow easily because of greater exposure to direct sunlight. Informants also mentioned that in the past, before the collapse of the Soviet Union and the revolution in Romania, replanting was performed annually, whereas now people no longer replant, as “*It*

is all about money.” On both sides of the border, illegal logging was also mentioned. Indeed, NB Hutsuls reported to have noticed that, during Soviet times, the forest was better managed for long-term exploitation, while now, much more attention is paid to obtaining an economic return in a short time.

Second, SB and NB Hutsuls reported changes in the tools and techniques used for resource extraction, and particularly timber extraction. Traditionally, local people used to harvest wood only during winter. In contrast, Hutsuls mentioned that now companies extract logs for timber throughout the year, which results in woody varieties with more accentuated shrinking and swelling of wood that is harder to process. Some SB informants reported that new logging techniques were implemented in the 1980s and 1990s, when the timber sector was a vital source of local employment. One informant said, *“In the time of Ceaușescu (1967-1989), there was a lot of work in the forest here. Many people worked. But now, people (of the timber companies) introduced strong tractors that make roads, get the trees: 10 trees; 20 m³ at once [...]. And in the time of Ceaușescu, it was not like that. People walked with horses and shipped (the trees) to the river. Everything was manual. And there were jobs. Now there are not”* (SB man, 1957).

Third, informants mentioned that changes in regulations, heavily affected by political changes, were important drivers of forest change. This was especially perceived in Romania, where forest ownership has partially changed since the time of Ceaușescu. Interviewees reported that with these changes they are not free to manage the forest or its resources because the management is done by private owners or state forestry districts. For example, they complained that they need official authorization to sell forest products in Romania. One informant said *“We are afraid that they [the government] will forbid us to do so [to pick mushrooms and berries] and this is the last thing we have from the forest. They created a national park but I don’t know if it will be for bad or for good”* (NB man, 1942).

Fourth, changes in forest management are also related to the loss of local knowledge. For example, Hutsuls observed that there are fewer mushrooms because *“People don’t know how to use them (the mushrooms) properly”* (NB woman, 1978). As a NB woman (1975) reported: *“Arnica was very curative. [...] a little bit is very good as an emollient. Hutsuls knew that it cannot be uprooted. And now these barbarians are uprooting everything in a row.”* Such lack of local knowledge was typically expressed by contrasting “us-Hutsuls” and “them-the others”, mainly referring to other Ukrainians. These narratives report that while Hutsuls know how to use resources properly, “they-the others” do not.

The people interviewed rarely mentioned climate change as a driver of forest change. Nevertheless, several informants mentioned that “*the climate has changed*”, and particularly the amount and intensity of rain. According to informants, these changes also drive some changes in the forest. For example, one informant reported that windstorm strength can now “*kill the forest*” (SB woman, 1950). Interviewees from Southern Bukovina showed us patches of forest destroyed by a windstorm that occurred a few years ago and mentioned that these events are increasingly more frequent. Indeed, some Hutsuls reported to have perceived such climate changes for the last 10-15 years.

Use of forest resources among Hutsuls

Hutsuls living on both sides the border use forest plants for food and medicinal preparations (see Appendix), although there are some important differences between the two groups. NB Hutsuls reported about 30% more forest medicinal plant DURs and taxa and about 21% fewer forest food DURs than SB Hutsuls (Figures 3 and 4).

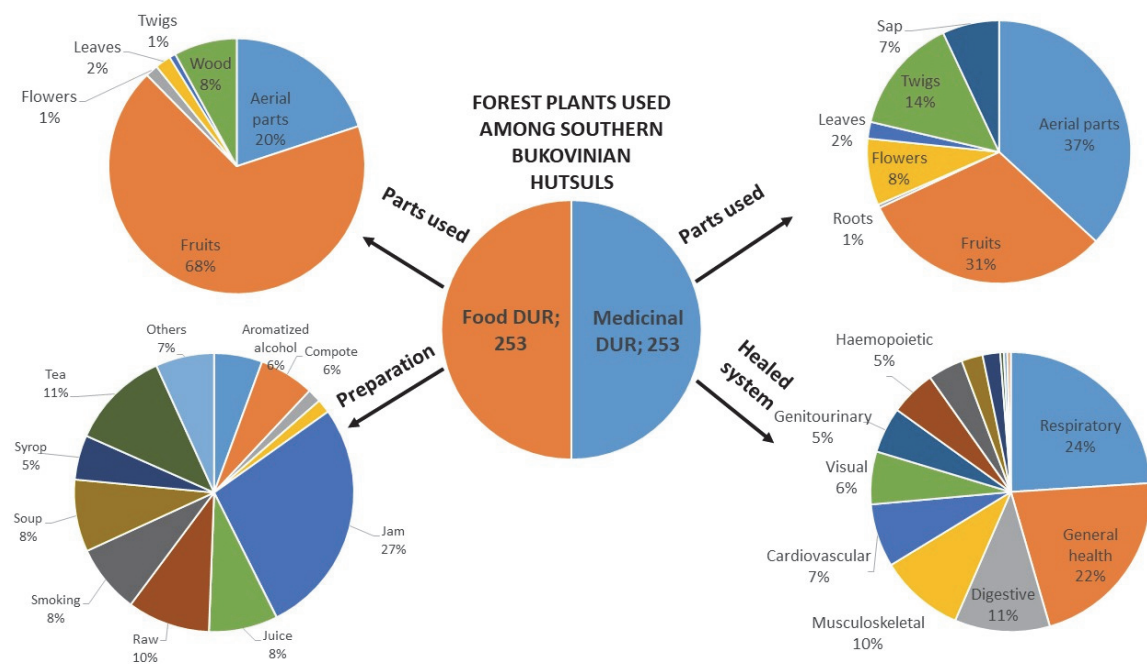


Figure 3. Distribution of food and medicinal use of resources among Hutsuls of Southern Bukovina, Romania (DUR, frequency of occurrence).

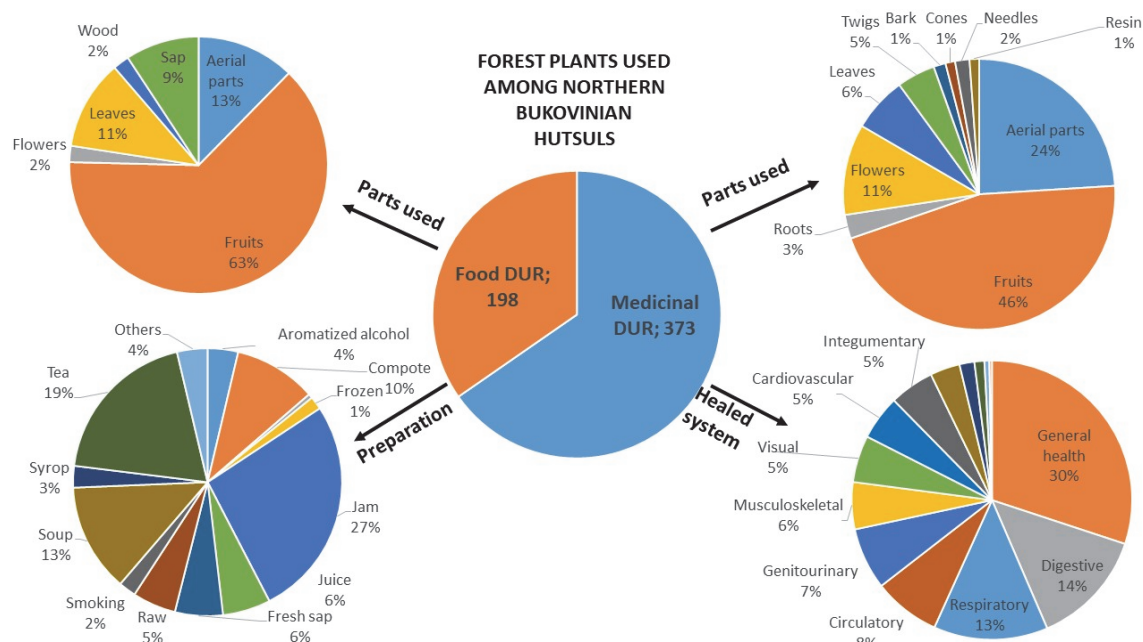


Figure 4. Distribution of food and medicinal use of resources among Hutsuls of North Bukovina, Ukraine (DUR, frequency of occurrence).

Forest medicinal plants

Forest medicinal plants were mentioned in both communities for treating several disorders, primarily of the digestive and respiratory systems, as well as for general health. Among SB Hutsuls, 253 medicinal DURs were recorded, corresponding to 16 taxa, including three taxa with medicinal uses only (*Abies alba*, *Betula pendula* Roth and *Pinus sylvestris* L.). The taxa most frequently mentioned as medicinal include *Vaccinium myrtillus* L., *Urtica dioica* L. and *Rubus idaeus* L. The plant part most commonly used for medicine was the fruit, followed by aerial parts (of seven taxa including *Urtica dioica*, *Fragaria vesca* L. and *Equisetum* sp. pl.), and coniferous twigs. Medicinal uses of forest taxa mainly targeted the respiratory system and general health. As for the digestive system, the plant most reported for its curative properties was *Vaccinium myrtillus*, which was also mentioned as being useful for vision.

Among NB Hutsuls, 373 medicinal DURs from 23 taxa were recorded. The most used plant part was fruit, which represented over 46% of all DUR, including the fruit of six species of forest berries. The aerial parts of 15 taxa were employed in several preparations including teas. Flowers of ten taxa were also used for various medicinal purposes in tea preparations. Among NB Hutsuls, 30% of taxa were considered useful for general health, of which *Rubus idaeus* was the most quoted. Among NB Hutsuls, the main use of forest medicinal plants was to treat general health issues, whereas among SB Hutsuls the most common use was to

treat problems of the respiratory system. In both communities, the digestive system was also treated using forest species, and in particular *Vaccinium myrtillus*. Indeed, this is the most important taxon among NB Hutsuls who mentioned 104 medicinal DURs for *Vaccinium myrtillus* compared to 45 medicinal DURs among SB Hutsuls. Another important category among NB Hutsuls was circulatory disorders (especially hypertension) often treated with forest medicinal plants (particularly *Viburnum opulus* L.). *Arnica montana* L. was used to treat the musculoskeletal system among SB Hutsuls.

Forest food plants

Romanian and Ukrainian Hutsuls reported the use of 17 and 22 forest food plant taxa, respectively. In both Hutsul communities, the most common preparation of edible plants was jam followed by tea and soup. Among SB Hutsuls, 253 DURs were recorded for food preparations. About 25% of DURs involved the preparation of jam from forest berries and *Picea abies*. Another important food category was tea. Ten percent of the DURs referred to forest berries eaten raw. Forest fruits were the most represented plant part (58%) followed by aerial parts (mainly *Urtica dioica* as soup and forest fruits prepared as teas). Among NB Hutsuls, 191 DURs were recorded for food preparations. Almost two out of three mentioned plant parts used were forest fruits, while aerial parts and leaves represented 11% and 10% of the reported DURs, respectively. Twenty-eight percent of the reported DURs were used for jam, 20% for tea, and 14% for soup. NB Hutsuls mentioned the preparation of tea from 13 taxa including forest fruits and other forest plants. The comparison of forest resource uses shows that SB Hutsuls reported about 25% more forest food DURs (= 75 DURs) than did NB Hutsuls, even though the latter reported the use of five more taxa compared to those living in Romania. This means that SB Hutsuls used food taxa more homogeneously than did NB Hutsuls. In both communities, the most important edible plant resource of the forest was forest fruits, which were important not only for their berries but also for their aerial parts, which were sometimes used as teas.

Discussion

Results from this work show that Hutsuls across the Romanian-Ukrainian border mostly share perceptions of forest benefits, while their reports on environmental changes and the drivers of these changes diverge. In addition, NB Hutsuls rely more on forest medicinal plants than do SB Hutsuls, who use forest plants for food and medicinal purposes in a more

balanced way.

Before discussing these results, we note three methodological caveats that might affect our findings. First, we acknowledge limitations in data collection associated with the use of open-ended interviews, and particularly with the fact that this technique does not allow for the reliable quantification of information. Despite this limitation, this methodological technique was chosen as it allows for better conversational flow and more nuanced information on the interviewees' perceptions. Second, we also acknowledge that our interpretations of interviewees' narratives might be affected by our dependence on translation. While the interviews were conducted in Romanian and Ukrainian, the topic of the forest is strongly embedded into Hutsul culture, so it is possible that it might have been better explained by the interviewees in their native Hutsul language. Finally, we are also aware that because our sample was not randomised, the perceptions presented here lack external validity.

The three main findings and their interpretations are summarized in table 2.

Table 2. Main findings and their interpretations of local perceptions and uses of forest resources among Hutsuls living in Northern and Southern Bukovina (currently in Ukraine and Romania respectively).

MAIN FINDING	INTERPRETATION OF THE FINDING
SB and NB Hutsuls share the perception that forests are vital for their livelihood, providing many benefits in economic terms, but also in terms of food security and health.	The commercialisation of forest products, is a more important source of cash income among NB than SB Hutsuls probably due to the different political (and economic) history NB Hutsuls show a predominance of the medicinal use of forest products probably because of their lower access to money and more barriers to access the healthcare system
NB Hutsuls who live in Ukraine perceived more ecological changes than SB Hutsuls who live in Romania.	NB Hutsuls might have reported more changes simply because forests on the Ukrainian side have undergone more changes than forest in the Romanian side, perhaps due to a different management history since the 1940s It is also possible that NB Hutsuls perceive more changes in forests because of the major importance of the forest and forest resources for their livelihoods. NB Hutsuls have less diversified sources of income compared to SB Hutsuls. Therefore, the gathering and commercialization of berries and mushrooms play a fundamental role in sustaining their livelihoods, constituting one of the sole sources of monetary income, as Hutsuls living in Ukraine appear to depend heavier on their surrounding environment
Hutsuls living in Romanian emphasized the drivers of forest change.	Clear cuts (among SB Hutsuls) and the overexploitation of forest resources (among NB Hutsuls), both refereeing to changes in management, were among the most quoted drivers of change The importance of the drivers of changes among SB Hutsuls could be explained by the more abrupt political changes with regard to forests which occurred in Romania

The first important finding of this work is that SB and NB Hutsuls share the perception that forests are vital for their livelihood, providing many benefits in economic terms, but also in terms of food security and health. Despite the overall similarity, a detailed analysis suggests an important difference. In Northern Bukovina, currently in Ukraine, commercialisation of forest products, such as mushrooms and berries, is a more important source of cash income than in Southern Bukovina, currently in Romania. Indeed, while the sale of forest products was reported in both communities, among SB Hutsuls it was considered mostly as a complementary source of income, whereas among NB Hutsuls it was considered a primary source of income. The sale of forest products link the Hutsuls with international markets through dealers who buy forest products from places located in very remote areas and sell to bigger buyers which will prepare the product for export(see Cioacă and Enescu 2018, Zhyla et al. 2018). Ethnobotanical data also suggest differences in uses of forest resources for household consumption, with SB Hutsuls mentioning 30% more food uses, but NB Hutsuls showing a predominance of the medicinal use of forest products, probably due to their lower access to money and larger number of barriers to access the healthcare system (Anzenberger et al. 2011). In other words, our ethnobotanical data reinforces the idea that NB Hutsuls are more dependent on forest resources than SB Hutsuls. For NB Hutsuls forest resources have a safety –net function as well as cash generation role.

The difference between NB and SB Hutsuls might be recent and probably linked to political changes. Indeed, the harvest of wild plants for medicinal purposes decreased in Romania for the decade 2009-2019 (our analysis on Romanian Forest Authority (ROMSILVA) data), whereas forest products still seem to play a crucial role in Ukraine, despite the perceived deterioration of their forests (Melnykovych and Soloviy 2014, Stryamets et al. 2015). In that sense, forest uses in Romania might be converging with the use of forest resources in other European countries, where plant gathering is mainly a recreational activity (e.g., Turtiainen and Nuutinen 2012, Remm et al. 2018), whereas forests uses in Ukraine correlate with the trends in Eastern Europe, where wild edible plants picked in the forest are an important source of income and food (e.g., Stryamets et al. 2015). We argue that such difference might be largely explained by the major social and political changes occurring in Romania (Sandu et al. 2020) and fostered by an emigration process that has promoted changes in mentality (Pescaru 2018). These changes are more limited in Ukraine, which does not belong to the European Union and has a limited migration flow compared to Romania.

The second important finding of this work is that NB Hutsuls who live in Ukraine perceived

more ecological changes than did SB Hutsuls who live in Romania. Those changes were found to affect forests (e.g., changes in the mean age of the trees) and forest resources (e.g., decreased abundance of food and medicinal wild plants). We suggest two potential explanations for this finding. NB Hutsuls might have reported more changes simply because forests on the Ukrainian side of the border have undergone more changes than forest in the Romanian side, perhaps due to a different management history since the 1940s. Indeed, in Northern Bukovina, after the collapse of the Soviet Union, the forestry enterprises started relying on their own economic resources due to the changes in the financial support from the State (Chernyavskyy et al. 2011b). This led to an intensification of forest resource use and to a decrease of forest employees. In addition, the forest management changed, for instance they switched from the planting of trees to natural regeneration (Shishkaninets 2011, Lavny 2019). Therefore, this resulted in an uneven forest management across the Romanian-Ukrainian border which may have led to the different perception of forest ecological changes between the two Hutsul communities.

It is also possible that NB Hutsuls perceive more changes in forests because of the major importance of the forest and forest resources for their livelihoods. It has been argued that people whose livelihoods depend on local resources are better observers of environmental change (Alessa et al. 2008, Shukla et al. 2019). Since 2007, Hutsuls living in Romania have been subsidized by the European Union for managing their meadows (e.g., making hay), subsidies becoming a relevant source of income for the rural population. Indeed, many Hutsuls visited in Romania were nearly self-sufficient for staple food production, and, at the same time, obtained cash from selling milk to a nearby factory through EU agricultural subsidies and from the remittances sent by relatives working in other European countries. These sources of income, together with the employment shift occurring in Romania with youth outmigration, might have impacted SB Hutsuls perception of forest ecological changes, as the time spent in the valley and in the forest is now reduced. Conversely, in Ukraine, NB Hutsuls have less diversified sources of income, which are indeed limited to the few resources such as forest products and vegetable and animal products provided by mountain family farming. In this economic context, the gathering and commercialization of berries and mushrooms play a fundamental role in sustaining their livelihoods, constituting one of the sole sources of monetary income, as Hutsuls living in Ukraine appear to depend more heavily on their surrounding environment.

The third important finding of this work is that drivers of changes in forest management,

while mentioned by Hutsuls belonging to both communities, were especially important in Romania. Clear cuts (among SB Hutsuls) and the overexploitation of forest resources (among NB Hutsuls), both relating to changes in management, were among the most quoted drivers of change. The finding is not new, as changes in management techniques (e.g. Babai 2017, Melnykovich et al. 2018, Nijnik van Kooten 2000), as well as illegal logging (Knorn 2012, Kuemmerle et al. 2009) have been reported in studies across several areas of the Carpathians.

It is interesting to note that while Hutsuls living in Ukraine observed more changes in forests, those living in Romania observed more drivers of forest changes. Given that political changes affecting forest were more quoted in Romania, the apparent contradiction in findings could be explained by the more abrupt political changes with regard to forests which occurred in Romania. Despite other political changes, forests are still fully state-owned in the Ukrainian study area, for which Hutsuls may not have perceived tumultuous changes in management as the access to forest resources is not limited. The situation is different in Romania where there has been a process of forest privatization which has affected people's ability to use the forest and its resources (Munteanu et al. 2016, Nichiforel et al. 2020). Indeed, Palaghianu and Nichiforel (2016) have already noted that the change in the Romanian political system in 1989 resulted in important challenges in the forest sector, such as the chaotic management of the process of forest restitution and the major governance failures in fostering responsible forest management. Together, such political differences might explain that Romanian informants mentioned more drivers of forest change.

Overall, analysing the perceptions of the changes in forests and the drivers of these changes is crucial to improving our understanding of how political changes have affected the relationship between Hutsuls and the forest. In Romania, political changes have resulted in the privatization and mechanization of forestry activities, leaving Hutsuls 'on the edge of the forest' with forests being increasingly exploited by foreign companies through local companies. Consequently, Hutsuls living in Romania perceive the forest as an important element which supports their identity, but less so their economy. Conversely, in Ukraine, Hutsuls showed a greater connectedness and a stronger tie to the forest. Hutsuls living in Ukraine mentioned forest overexploitation, especially with regard to berries and mushrooms, and underlined the essential role of gathering from the forest for their livelihoods.

It is worth noticing that, regardless of their material dependence on forest, both Hutsul communities consider the current forest management as unsustainable due to the clear-cuts,

overexploitation of forest fruits, lack of reforestation policies and illegal logging, which can also be considered as a consequence of political changes. This trend is confirmed by several recent publications both in the academic (e.g., in Romania Bouriaud 2005 and in Ukraine Kuemmerle et al. 2009) and general publications (e.g., Greenpeace Romania 2019, Walker 2020; Bezpiatchuk 2020, Replianchuk and Kokhan 2018, Earthsight 2018).

In their narratives, Hutsuls made clear evaluations of past and present management techniques and the impacts of such techniques on forests and forest resources. Such insights could represent important elements for contribution of Hutsul traditional knowledge to the sustainable forest management. Given the Hutsuls' deep understanding of their interactions with local forestlands, they could make an invaluable contribution to the implementation of sustainable forest management practices. Indeed, the inclusion of perspectives of local communities, with their centuries-long co-evolution with the surrounding environment, in the forest-related policy making arena has already been suggested (Elbakidze and Angelstam 2007, Johann et al. 2012, Melnykovich et al. 2018). Moreover, the divergences found in the Hutsul communities living across the border suggest the need for context-based strategies for the involvement of local communities in this process, which is crucial in post-socialist countries (Vasile 2008).

Conclusions

Overall, our results show that Hutsul perspectives on forest benefits are similar on the two sides of the Romanian-Ukrainian border, yet the perceptions of forest ecological changes and the uses of forests resources differ. We argue that the divergent perceptions of forest ecological changes could be largely due to changes in forest management which were implemented differently in the separated political contexts in which the two Hutsul communities have lived in the last 80 years. Indeed, border creation which occurred in the early 1940s has resulted in different socio-economic conditions in the two Hutsul communities, which have remarkably influenced the use of forest resources and their connectedness to forestlands.

On both sides of the border, Hutsul perspectives on forest management and its impacts on forest resources should be increasingly taken into account in landscape management plans.

Local societies' impacts on forest and forest management impacts on social groups are important aspects that should be considered in landscape management decisions, particularly

in hotspots of biological and cultural diversity. As political borders affect environmental management schemes, the different perspectives of forest management across borders should be considered in decisions regarding the management of ecologically similar landscapes.

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Conclusions

In this final section, I reflect upon the main findings of this dissertation, highlighting its most relevant contributions. I conclude with potential future lines of research.

Main contributions

In this work, I used a cross-border perspective to explore differences in ethnobotanical knowledge, its transmission and environmental perceptions among Hutsuls (and Romanians) living in Ukrainian and Romanian Bukovina. In particular, I used the framework of the DiGe project to address:

- a) similarities and differences in ethnobotanical knowledge from a cross-border perspective (Chapters I, II, III),
- b) similarities and differences in ethnobotanical knowledge transmission from a cross-border perspective (Chapters I and II), and
- c) similarities and differences regarding local perceptions of the forest across the border (Chapter III).

The first main contribution of this dissertation relates to the finding that political contexts can shape local knowledge systems. For instance, in Chapter I, I discovered that Hutsuls living in Ukraine hold a richer corpus of local knowledge related to wild medicinal plants than do Hutsuls living in Romania, possibly due to Soviet influences which added new plants to the local ones. As Romania was not part of the Soviet Union and Hutsul territory was not influenced by the centralization policies implemented by Ceausescu, the LEK held by Hutsuls living in Romania has somehow been crystallized. This finding advances our understanding of the political mechanisms that can shape local knowledge systems. This is especially relevant for the study of LEK evolution in the current European context, in which common policies are implemented in different socio-economic scenarios.

The second main contribution of this dissertation pertains to the impact of political contexts on knowledge transmission strategies. Thus, political contexts can affect not only the content and richness of LEK corpora, but also the way this knowledge is transmitted. Indeed, I found that communities in Southern Bukovina (Romania) are less bibliophilic than in Northern Bukovina (Ukraine), where communities make larger use of knowledge sources such as

books, magazines, television and the Internet. This is most likely due to the strong influence of the bibliophilic Soviet culture from the 1940s to 1991, and probably also to the promotion of Russian language and values. In the current global scenario, this finding is relevant as it can help promote effective projects for LEK maintenance. Indeed, to share Hutsul/Romanian LEK with the next generations, different strategies should be implemented across the border, which should include mainly intergenerational transmission in Romania, and possibly integration with visual and written sources in Ukraine.

From the first and second main findings, I concluded that the hybridization of LEK regarding wild food and especially medicinal plants with elements derived from other geographical and cultural contexts has enriched the corpus of LEK, shaping a *glocal* corpus of knowledge with different knowledge transmission strategies. Indeed, the LEK held by Hutsuls and Romanians living in Ukraine first incorporated Soviet elements that enriched it, but with homogeneous elements (i.e., which can be commonly found in post-Soviet contexts). Such a finding advances our understanding of LEK homogenization and standardization, which have recently received the attention of scholars as phenomena possibly related to LEK erosion (e.g., Aswani et al. 2018; Pieroni and Sõukand 2017).

The third main contribution of this thesis concerns the divergent environmental perception of culturally homogenous communities living across the border. In Chapter III, I showed that the different political contexts asymmetrically affected the perceptions of forest ecological changes, as well as the use of forests resources, and yet a high level of transboundary agreement was found regarding the benefits provided by the forest. I argued that the divergent perceptions and use of local resources could be largely due to the different environmental management policies implemented in the two political contexts. Moreover, the different socio-economic conditions across the border have influenced to a great extent the use of forest resources by communities and their connectedness to forestlands. This result should represent a basis on which to implement effective transboundary environmental policies, especially in bioculturally rich border areas.

Limitations of this dissertation

This dissertation has two main limitations.

First, the fieldwork was expected to be longer and distributed across at least three springs/summers. Unfortunately, the Covid-19 pandemic arrived just before the time I was

to spend six months in Bukovina (March-August 2020). Thus, I could not further explore the area, deepening my understanding of this region and addressing the cross-border ethnobiology of Bukovinian beekeepers and pastoralists. I therefore had to rely on the data I collected in the summers of 2018 and 2019 to realise this dissertation.

Second, none of the people who participated in the Bukovinian fieldwork could speak the Hutsul language. While Hutsuls on both sides of the border could speak the national language (either Romanian or Ukrainian) perfectly, I may have missed some of the important nuances of their narratives.

Future perspectives

The findings of this work call for further research in four main directions.

First, similar research in different European contexts should be conducted. For instance, a similar cross-border study of the local plant knowledge held by Walser communities living in Italy and Switzerland and separated by a centuries-long border could provide us with a good comparison of the relevance and extent of cultural and political contexts.

Second, Chapter II suggests that approaching the cross-border study of LEK from a linguistic perspective could also advance our understanding of the evolution and sources of ethnobotanical knowledge.

Third, addressing other important milieux, such as pastures and meadows, could enhance our understanding of the effects of policies not only implemented during Soviet times, but also promoted in Romania by the Common Agricultural Policy since 2007.

Fourth, considering my focus on the Carpathian Mountains, the pressing social, environmental and climatic changes call for attention to mountain areas where biological and cultural diversity is often high. Documenting, but above all understanding, the complex and dynamic relationships between communities, biota and environments could provide insights into the resilience of such crucial ecosystems.

Ethnobiological studies are especially needed to understand and possibly improve the functioning of fragile and vulnerable ecosystems threatened by relevant global changes including climate change.

In this dissertation, I have addressed only one small corner of the biocultural diversity in Europe. Understanding and appreciating the great (and hidden) richness that Europe boasts in terms of biological and cultural diversity could, in fact, help to embrace its beauty in terms

of the similarities and differences of current nations and to build bridges for a common transboundary environmental management. It is widely acknowledged that natural resources are being increasingly jeopardized and possibly the cause of conflicts. A common transboundary understanding and (environmental) management could be a crucial peacekeeping strategy in the face of current global changes.

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Annex I

Besides producing the content of this dissertation, during my Ph.D. I have led seven and contributed as co-author to other seven peer-reviewed articles and other three are currently under revision.

Mendoza, J. N., **Mattalia, G.**, Prüse, B., Kochalski, S., Ciriaco, A., Pieroni, A., & Sõukand, R. (2021). “Wild fish are a blessing”: changes in fishing practices and folk fish cuisine around Laguna Lake, Northern Philippines. *Journal of Ethnic Foods*, 8(1), 1-11.

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Moreover, I have presented the results of my research in eleven scientific events held in six countries.

Mattalia, G., Stryamets, N., Pieroni, A., Sõukand R. The emotional tie to the forest: contrasting perspectives from Carpathians mountains (SW Ukraine) and Apennines mountains (Central Italy). «The future of the forest» 60^o Meeting of the Society for Economic Botany, Cincinnati (USA) 2-6 June 2019

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Mattalia, G., Stryamets, N., Sõukand R. Commonalities and differences in the use of wild food and medicinal plants among autochthonous Hutsuls and Romanian speakers living in the Carpathian area of northern Bukovina, Ukraine "Challenges and perspectives for the coming years" VII International Congress of Ethnobotany, Recife (Brazil) 16-19 October, 2019

Mattalia, G., Stryamets, N., Sõukand R. *Cultural salience of bee products in the folk medicine of Bukovinian Hutsuls (Chernivtsi oblast, Ukraine)* "Sustainable Beekeeping in Ukraine" Yuriy Fedkovych Chernivtsi National University Chernivtsi (Ukraine) 6-8 November, 2019

Mattalia, G., Stryamets, N., Balázsi, G. Molnár, A. Gliga, A. Pieroni, R. Sõukand, V. Reyes-García "The forest is our gold": perception of forests and resource use among Hutsuls living in the Ukrainian and Romanian Carpathian Mountains. "Global Mountain Sustainability Forum", virtually in Sexten (Italy) 5-6 October, 2020

Mattalia, G., From the Alps to the Carpathians through the Cordillera Central: What can we learn from the interaction of local communities with the surrounding environment? University of Gastronomic Sciences, virtually in Pollenzo (Italy) 22 February 2021

Mattalia, G., *Cross-border ethnobiology: insights from the Eastern Carpathians* “Biological and cultural diversity in the context of European vulnerable ecosystems”, virtually in Venice (Italy), 28-29 April 2021 (organizer)

Mattalia, G., Belichenko O., Kalle R., Kolosova V., Kuznetsova N., Prakofjewa J., Stryamets N., Pieroni A., Volpato G., Sõukand R. *Divergent Patterns of Erosion of Ethnoveterinary Knowledge in Eastern European Borderlands (oral communication)* “Annual Conference of the Society of Ethnobiology”, virtually in Cedar City (USA), 12-14 May, 2021

Mattalia, G., Stryamets, N., Pieroni, A., Volpato, G., Sõukand R., *Countertrending local knowledge erosion: persistence of traditional cattle healing practices in the Bukovinian Carpathians*. “Forum Carpathicum”, virtually in Brno (Czech Republic), 21-15 June, 2021

Mattalia, G., Stryamets, N., Sõukand R. *Divergent uses of wild food and medicinal plants by Hutsuls and Romanians living in the upper Suceava Valley, NE Romania* “XIV Congress of Anthropologists and Ethnologists of Russia”, virtually in Tomsk (Russian Federation), 7-9 July 2021

Mattalia G. Divergent trajectories of local ecological knowledge among communities divided by a border: insights from Hutsuls and Romanians of Bukovina (Romania and Ukraine) „New Challenges for Borderlands Studies: Regional, European and Global Perspectives” virtually in Opole (Poland), September 8-10 2021

During the the Ph.D. I have participated to three week-long workshops in Austria, Brazil and Catalonia.

“*Summer School 2018: Citizen Science in Theory and Practice*” Wien University, (Austria) 14-20 October 2018

“*Licci Training Workshop*” Autonomous University of Barcelona (Catalonia), 17-21 June 2019

“*International School of Ethnobiology*” Federal University of Pernambuco, Recife (Brazil), 8-11 October 2019

In addition, I was teaching assistant of prof. Sõukand in a master course and led two small courses at the University of Gastronomic Sciences. At UNIVE, I have co-supervised thesis and internships of six students from four countries. Here come the details.

“*International School of Ethnobiology*” Federal University of Pernambuco, Recife (Brazil), 8-11 October 2019

2018/2019 Assistant “Global Environmental Change” Master in Environmental Sciences, Ca’ Foscari University of Venice, Italy

2019/2020 Visiting lecturer “Edible Garden Practices” Master of Gastronomy, Creativity, Ecology and Education, University of Gastronomic Sciences of Pollenzo, Italy

2020/2021 Visiting lecturer “Edible Garden Practices” Master of Gastronomy, Creativity, Ecology and Education, University of Gastronomic Sciences of Pollenzo, Italy

Supervision of Master/Bachelor Degree in Environmental Sciences of:

Jimlea Nadezhda Mendoza (2019/20)

James Njogu Nyaga (2020/21)

Brian Otieno Owuor (2020/21)

Denisa Cutuca (2020/2021)

David Joly (2020/2021)

Virginia Quarantotto Vittori (2020/2021) (internship)

During the Venetoneight Researchers' Night, Italy, I have participate to the radio talk “Back To The Roots: Ethnobotany of Divided Generations” with Prof. Renata Sõukand and Julia Prakofjewa <https://www.youtube.com/watch?v=5Sptydws5Q4>.

Finally, in the period 2018-2021 I have served as reviewer for 13 peer-review journals as well as for the Second Order Draft of the Working Group II contribution to the IPCC Sixth Assessment Report Climate Change 2021: Impacts, Adaptation and Vulnerability from December 2020 to January 2021.

- Ambio
- Biodiversitas
- Economic Botany
- Environment, Development and Sustainability
- Ethnobotanical Research and Application
- Frontiers in Pharmacology
- Journal of Ethnobiology and Ethnomedicine
- Journal of Ethnopharmacology
- Journal of Herbal Medicine
- Nordic Journal of Botany
- Springer Nature Books
- Sustainability
- Trees, Forests and People

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Io sottoscritto GIULIA MATAIA
nat A a CHIERI (prov. TO.) il 09/05/1981
residente a TORINO in CORSO BELGIO n. 81

Matricola (se posseduta) 956443 Autore della tesi di dottorato dal titolo:

DIVERGENT TRAJECTORIES OF LOCAL ECOLOGICAL
KNOWLEDGE AMONG DIVIDED COMMUNITIES:
INSIGHTS FROM HUTSULS and ROMANIANS OF BUKOVINA

Dottorato di ricerca in SCIENZE AMBIENTALI

(in cotutela con UNIVERSITAT AUTÓNOMA DE BARCELONA)

Ciclo 34

Anno di conseguimento del titolo 2022

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Estratto per riassunto della tesi di dottorato

Studente: GIULIA MATTALIA matricola: 956443

Dottorato: SCIENZE AMBIENTALI

Ciclo: 34

Titolo della tesi:

Divergent trajectories of local ecological knowledge among divided communities: insights from Hutsuls and Romanians of Bukovina (Romania and Ukraine)

Abstract:

Plants are crucial for the survival of the humankind. The relationship between people and plants has evolved over centuries, shaped by specific geographical, ecological, social, cultural, economic and political contexts in which people and plants are found. Indeed, it is widely acknowledged that local ecological knowledge systems are not static, but constantly evolve, adapting to new ecological, social, cultural and political conditions. It is also recognized that these local knowledge systems are being increasingly jeopardized by the rapid environmental and socio-economic changes we see today. Among the various socio-economic changes that affect local knowledge, institutional policies have received little scholarly attention, although they can have important impacts on local knowledge. In particular, the impact of policies on local knowledge has only been partially studied in Europe, with a couple of investigations addressing cross-border ethnobotanical knowledge.

In this context, this dissertation aims to further our understanding of how political borders affect local knowledge of the use of wild food and medicinal plants and its transmission, as well as local environmental perceptions. To this end, I worked in the territory of Bukovina, a historical region of Eastern Europe united until the 1940s, when it was divided between the Soviet Union and the Socialist Republic of Romania, currently Ukraine and Romania. Specifically, in this multicultural region, I focused on cross-border communities of Hutsuls and Romanians.

The 135 semi-structured interviews conducted in summers 2018 and 2019 on the use of wild food and medicinal plants, the transmission of such knowledge, and the perception of forest

and its resources, revealed three main divergences that constitute the three central chapters of this dissertation.

First, the corpora of knowledge related to plants, especially medicinal plants, are richer among Hutsuls and Romanians living in Ukraine than among Hutsuls and Romanians living in Romania. I argue that this difference originates in the divergent political (and multilingual) context of the two countries, with only Ukraine being influenced by Soviet-derived elements.

Second, ethnobotanical knowledge transmission occurs in divergent forms across the border. Hutsuls and especially Romanians living in Ukraine, in addition to information transmitted orally, significantly rely on written and visual sources for obtaining information regarding wild food and medicinal plants. Conversely, in Romania, this information is mainly transmitted orally within the family or by local elders.

Third, Hutsuls living across the border share perceptions of forest benefits but differ in their perceptions of the drivers of forest change, possibly due to the diverging political contexts in which they live, and thus diverging forest management policies. In addition, possibly as a result of different socio-economic conditions, Hutsuls living in Ukraine rely more on forest medicinal plants than do Hutsuls living in Romania.

In conclusion, the results of this work suggest that in the context of Bukovina, and possibly beyond it, the creation of new political boundaries can result in different corpora of local knowledge related to wild food and medicinal plants, divergent trajectories of ethnobotanical knowledge transmission strategies, and dissimilar perceptions and use of relevant milieux. I argue that such dissymmetry can be due to the different socio-economic contexts created as a result of different institutional policies. Further research in other geographical contexts with similar cross-border geopolitical situations is required to confirm the results of this work.

Firma dello studente
