Andrea Pieroni · Cassandra L. Quave
Editors

Ethnobotany and Biocultural Diversities in the Balkans

Perspectives on Sustainable Rural Development and Reconciliation

Springer

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For Sulejman Redžić, our friend
and inspiration for this book.

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Chapter 1
Ethnobotany in the Balkans: *Quo Vadis*?

Andrea Pieroni and Cassandra L. Quave

1.1 Beginnings

1.1.1 Andrea

One spring day, 15 years ago, I (AP) visited the Warburg Library in London in search of some old medico-folkloric papers focusing on the Mediterranean area. While I was searching for this, I noticed a hidden, old, dusty, monograph, which captured my attention since it was located at the edge between the Mediterranean and the Eastern European sections. It was Leopold Glück's work on folkloric medicine and ethnobotany in Bosnia, probably the first modern ethnobotanical work ever written in Southeastern Europe (Glück 1894); I had never heard of it before, neither had I ever found this reference, and I still remember the trepidation with which I copied the monograph and ran home to read it.

But my (AP's) interest in the ethnobiology of the Balkans and, even well before, in that of Balkan diasporas (Pieroni et al. 2002a, b; Pieroni and Quave 2005; Quave and Pieroni 2005; Nebel et al. 2006; di Tizio et al. 2012) actually began before that morning. I believe that it all started in August 1991, when the ship *Vlora*, overcrowded with several thousand desperate Albanians who tried to escape their country after the fall of the Communist regime and the economic collapse, arrived at the port of Bari, Italy. Those unforgettable images, which were aired live on Italian television, cut my skin like a knife, and were shocking, at least for a young Italian university student, who had never been confronted with something similar before.

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Fig. 1.1 Gorani man from NE Albania showing *Sambucus nigra*. (Photo: Cassandra L. Quave)

Without the *Vlora*, I believe that my life would have not been the same and without this shock I would have never become an ethnobotanist and surely never an ethnobotanist working in the Balkans and on Balkan diasporas. For more than 15 years, I have been travelling all over many places in the Balkans, and especially within the Albanian territories, touching several locations, from the most isolated mountainous areas to the new, super-busy, vibrant urban centers. This region remains to me still today—as it has been maybe for those "Westerners" who visited the region and described the local medical and food folklore and attached customs one century ago (Cozzi 1909; Cozzi 1914; Durham 1923; Doda and Nopcsa 2007)—an incredibly potent space: Because of its austere landscape, the warm, touching hospitality of its people, the fascinating mosaic of cultural and religious differences, the dense history and heritage, the surviving attachment of the locals to "their" customs, and, among them, plant uses (Fig. 1.1).

1.1.2 Cassandra

My (CLQ) story with the Balkans began 13 years ago in the tiny Arberëshë village of Ginestra, located in Southern Italy. The Arberëshë are the descendants of Albanians who immigrated to Italy in several migration waves almost five centuries ago. Uniquely, the Arberëshë language represents an ancient form of Albanian, and is listed as an endangered language (Moseley 2010). We (CLQ and AP) spent many months conducting field research on the use of local wild plants for food (Pieroni et al. 2002a) and medicine (Pieroni et al. 2002b; Quave et al. 2008), and also studied other folkloric practices related to emic perspectives concerning health and healing (Quave and Pieroni 2002; Quave and Pieroni 2005).

It was during this time that my fascination with the Balkans began—even before I had ever actually traveled there. This experience with Arberëshë communities

Fig. 1.2 Elderly Serbian traditional environmental knowledge (*TEK*) holder in Pešter, Buđevo, SW Serbia. (Photo: Andrea Pieroni)

opened the door to my curiosity concerning the people, languages, and cultures of the Balkans, and Albania, in particular. This fascination only deepened when I married an Arberëshë man from Ginestra, and now his history, his ancestors, and his linguistic roots have become part of my family. The research that we (AP and CLQ) undertake is deeply personal to me because it reflects not only our academic interests but also a piece of the traditional knowledge and heritage that is passed down to my children (Fig. 1.2).

1.2 A Path Forward

The draft idea for this edited book was conceived 2 years ago while we (AP and CLQ) were in Kukës, Albania, during a rainy and (in the mountains) even snowy May. We were there to conduct field research among the Gorani and Albanians inhabiting the isolated highlands at the borders between Albanian and Kosovo. The main conceptual linchpin of this book was that the Balkans represent for ethnobiological studies—and for ethnobotany in particular—an extraordinary, unique arena, given the incomparable biological and cultural complexity of this territory within Europe.

1.2.1 The Role of Ethnobotany

Recent field studies published in international journals have confirmed—certainly within the frame of a clear coexistence of old practices and "modern" uses—a remarkable resilience of ethnobotanical knowledge (Pieroni et al. 2003; Redžić 2006;

Fig. 1.3 Albanian woman holding *Chenopodium bonus-henricus*, one of the most appreciated wild vegetables in the area, Rrogam, Northern Albania. (Photo: Andrea Pieroni)

Fig. 1.4 Elderly woman from the Venetian diaspora in Romania sitting in her home garden. (Photo: Andrea Pieroni)

Jarić et al. 2007; Redzic 2007; Dogan et al. 2008; Pieroni 2008; Pieroni and Giusti 2008; Pieroni 2010; Redzic 2010a, b; Šarić-Kundalić et al. 2010; Menković et al. 2011; Mustafa et al. 2011; Nedelcheva et al. 2011; Nedelcheva and Dogan 2011; Papp et al. 2011; Šarić-Kundalić et al. 2011; Dénes et al. 2012; Molnár 2012; Mustafa et al. 2012; Pieroni et al. 2012; Babai and Molnár 2013; Łuczaj et al. 2013a; b; Papp et al. 2013; Rexhepi et al. 2013; Savikin et al. 2013; Zlatković et al. 2014). We strongly believe that exactly this complexity, which has also been one of the driving forces for the turbulent recent and less recent history of the area, could represent however the key turning point for fostering a peaceful, viable, environmentally and socially sustainable future.

Ethnobotany is, in fact, not just about recording lists of plants and plant uses, but, in a more visionary and fascinating way, it is about a deep understanding of how socio-ecological microsystems work. It is about the exploration of how, over the centuries, the complex interplay between biota and human societies have fostered

the creation of landscapes, food habits, emic strategies of health-seeking behaviors, social relations, and even concepts of beauty: in other words, the diversity of life in all its forms (Maffi and Woodley 2010; Figs. 1.3 and 1.4).

1.2.2 Traditional Environmental Knowledge

Traditional environmental knowledge (TEK) has been defined as a "cumulative body of knowledge, practice and belief evolving by adaptive processes and handed down through generations by cultural transmission, about the relationship of living beings (including humans) with one another and with their environment" (Berkes 1999). The TEK of the Balkans, then, holds an enormous potential, still largely untapped. Moreover, TEK is becoming central today in many strategies aimed at shaping truly sustainable future for the region. This encompasses multiple perspectives, for example:

- Community-based strategies of in situ and ex situ (botanical gardens) biocultural conservation
- Small-scale herbal markets
- Niche food products
- Handicrafts and folkloric museums
- Ecotourism
- Reconciliation policies among different ethnic and religious groups in rural and mountainous areas

We believe that not only the scientific community (which for ethnobiology is always made up of natural, medical, and social scientists, as well as by scholars of the humanities) but also, and especially, external stakeholders (both from the public and private sectors, as well as international bodies and organizations) may be interested in learning more about the relations between plants and people in this fascinating area of the globe. Differently from one century and more ago, when medicinal plants from the Balkans were already traded into Western Europe, today, despite the dominant position that southeastern herbal raw material still has in Europe (Kathe et al. 2003; Londoño et al. 2008; Tomićević et al. 2011), the goal of medicinal and wild food plants-centered studies should be on a better understanding of the local perceptions of plants, which are crucial in turn for both serving truly community-based food sovereignty and public health policies. To reach this goal, both local and international actors (scholars, NGOs, SMEs, institutions, farmers' associations) need to work together.

Thus, within this framework, the ethnobiological approach here offers a holistic perspective on human–environment/biota relations. This concept emerged in the 1980s (ISE 2012) with the purpose of bridging the gap between scientists and traditional societies (including local and Indigenous communities) in the common understanding that only a comprehensive view of the biocultural environment is able to foster long-term, sustainable solutions that contribute to the well-being of all biota.

Fig. 1.5 The author (AP) with one of the last remaining families of Nistrovë, Reka Valley, Macedonian side of the Mt. Korab, Western Macedonia. (Photo: Andrea Pieroni)

1.3 Overview

The chapters in this book cover several different areas of the Balkan Peninsula: Albania, Serbia, Montenegro, Kosovo, Bosnia and Herzegovina, Macedonia, Bulgaria, as well as the contiguous territories of coastal Croatia and central Romania. This overview of Balkan ethnobotany is not intended, however, to be comprehensive, nor to show the geographical variety of ethnobotany only. Our aim for this volume is to offer instead a panoramic view of the slightly different approaches and accents occurring in the Balkan ethnobotany: from studies focusing specifically on wild food plants, to others, which focus on wild medicinal plant remedies and their potential applications, from surveys connecting plant perceptions to historical trajectories to studies that focus more on cross-cultural and anthropological perspectives. We have organized the chapters by general topic: (I) From Folk Medicine to the Medicinal Plant Trade, (II) Balkan Traditional Plant-Based Foods: Beyond the Ottoman Cuisine, and (III) Building Small-Scale, Environmentally and Socially Sustainable Economies. We believe that this broad compilation may offer a synthetic view on the current state of the art, but, much more interestingly, may also inspire new or further research into these mosaics (Figs. 1.5 and 1.6).

1.3.1 Dedication and Concluding Remarks

Finally, we would like to make a special note of who we wish to dedicate this edited volume. On 1 January 2013, a few of us received an email from our friend and colleague Sulejman Redzic, University of Sarajevo, containing a couple of his most recent ethnobotanical works conducted in Bosnia as attachments. Just a couple of

Fig. 1.6 An Albanian man describes how to eat local wild plants, such as this *Rumex* sp. (Photo: Cassandra L. Quave)

days later Sulejman disappeared, only to be found dead a few weeks later (in circumstances that still remain obscure) close to a river in the outskirts of Sarajevo, in the Republika Sprska of Bosnia. We will never forget that day and the pain, which is still with all of us as we write, who were also Sulejman's friends and colleagues.

Sulejman was not only a terrific plant ecologist and ethnobotanist but also a scholar happily engaged within Bosnian civil society. He was a scholar who went through the horrible days of the Siege of Sarajevo in the 1990s by helping his people to cope with the daily lack of food resources via radio programs aimed at spreading information concerning wild plants to eat during this period of famine. We would ask that the readers keep this picture in their minds while going through the book.

Ethnobotany is best described as the science of survival (Prance 2007), and indeed it was the Balkan ethnobotanical knowledge that helped to sustain local communities also during the sad days of the horrible atrocities and famine that occurred less than two decades ago in this region. We believe that ethnobotany and TEK are inextricably linked to the destiny of all of our Balkan friends; and, as an inseparable companion, it is something to be cherished and cared for.

References

Babai D, Molnár Z (2013) Multidimensionality and scale in a landscape ethnoecological partitioning of a mountainous landscape (Gyimes, Eastern Carpathians, Romania). J Ethnobiol Ethnomed 9:11

Berkes F (1999) Sacred ecology: traditional ecological knowledge and resource management. Taylor & Francis, Philadelphia

Cozzi E (1909) Malattie, morte, funerali nelle montagne d'Albania. Anthropos 4:903–918

Cozzi E (1914) Credenze e superstizioni nelle montagne dell'Albania. Anthropos 9:449–476

Dénes A, Papp N, Babai D, Czúcz B, Molnár Z (2012) Wild plants used for food by Hungarian ethnic groups living in the Carpathian Basin. Acta Soc Botan Pol 81(4):381–396

di Tizio A, Łuczaj ŁJ, Quave CL, Red S, Pieroni A (2012) Traditional food and herbal uses of wild plants in the ancient South-Slavic diaspora of Mundimitar/Montemitro (Southern Italy). J Ethnobiol Ethnomed 8:21

Doda BE, Nopcsa F (2007) Albanisches Bauernleben in oberen Rekatal dei Dibra (Makedonien). LIT, Vienna

Dogan Y, Nedelcheva AM, Obratov-Petković D, Padure IM (2008) Plants used in traditional handicrafts in several Balkan countries. Indian J Tradit Knowl 7(1):157–161

Durham E (1923) Some Balkan remedies for diseases. Man 23:131–135

Glück L (1894) Skizzen aus der Volksmedicin und dem medicinischen Aberglauben in Bosnien und der Hercegovina. Wiss MitthBosnien Herceg 2:392–454

ISE (2012) International Society of Ethnobiology Constitution. http://ethnobiology.net/about/ise-constitution/. Accessed 18 Aug 2014

Jarić S, Popović Z, Mačukanović-Jocić M, Djurdjević L, Mijatović M, Karadžić B, Mitrović M, Pavlović P (2007) An ethnobotanical study on the usage of wild medicinal herbs from Kopaonik Mountain (Central Serbia). J Ethnopharmacol 111(1):160–175

Kathe W, Honnef S, Heym A (2003) Medicinal and aromatic plants in Albania, Bosnia-Herzegovina, Bulgaria, Croatia and Romania. BfN, Bonn

Londoño PT, Doka D, Becker H (2008) Collection of medicinal and aromatic plants in Albania—an analysis given by examples of the surroundings of Peshkopi (Dibër Region). Zeitschrift Arznei Gewurzpflanzen 13(4):153–160

Łuczaj Ł, Fressel N, Perković S (2013a) Wild food plants used in the villages of the Lake Vrana Nature Park (northern Dalmatia, Croatia). Acta Soc Botan Pol 82(4):275–281

Łuczaj Ł, Zovkokoncic M, Milicevic T, Dolina K, Pandza M (2013b) Wild vegetable mixes sold in the markets of Dalmatia (southern Croatia). J Ethnobiol Ethnomed 9:2

Maffi L, Woodley E (2010) Biocultural diversity conservation: a global sourcebook. Routledge, London

Menković N, Šavikin K, Tasić S, Zdunić G, Stešević D, Milosavljević S, Vincek D (2011) Ethnobotanical study on traditional uses of wild medicinal plants in Prokletije Mountains (Montenegro). J Ethnopharmacol 133(1):97–107

Molnár Z (2012) Classification of pasture habitats by Hungarian herders in a steppe landscape (Hungary). J Ethnobiol Ethnomed 8:28

Moseley C (2010) Atlas of the world's languages in danger, 3rd ed. UNESCO Publishing, Paris

Mustafa B, Hajdari A, Pajazita Q, Syla B, Quave CL, Pieroni A (2011) An ethnobotanical survey of the Gollak region, Kosovo. Genet Resour Crop Evol 59(5):1–16

Mustafa B, Hajdari A, Krasniqi F, Hoxha E, Ademi H, Quave CL, Pieroni A (2012) Medical ethnobotany of the Albanian Alps in Kosovo. J Ethnobiol Ethnomed 8:6

Nebel S, Pieroni A, Heinrich M (2006) Ta chorta: wild edible greens used in the Graecanic area in Calabria, Southern Italy. Appetite 47(3):333–342

Nedelcheva A, Dogan Y (2011) Usage of plants for weather and climate forecasting in Bulgarian folk traditions. Indian J Tradit Knowl 10(1):91–95

Nedelcheva A, Dogan Y, Obratov-Petkovic D, Padure IM (2011) The traditional use of plants for handicrafts in southeastern Europe. Hum Ecol 39(6):813–828

Papp N, Bartha S, Boris G, Balogh L (2011) Traditional uses of medicinal plants for respiratory diseases in Transylvania. Nat Prod Commun 6(10):1459–1460

Papp N, Birkás-Frendl K, Farkas A, Pieroni A (2013) An ethnobotanical study on home gardens in a Transylvanian Hungarian Csángó village (Romania). Genet Resour Crop Evol 60:1423–1432

Pieroni A (2008) Local plant resources in the ethnobotany of Theth, a village in the Northern Albanian Alps. Genet Resour Crop Evol 55(8):1197–1214

Pieroni A (2010) People and plants in Lëpushë. Traditional medicine, local foods, and post-communism in a North Albanian village. In: Pardo de Santayana M, Pieroni A, Puri R (eds) Ethnobotany in the new Europe: people, health and wild plant resources. Berghahn, New York, pp 16–50

Pieroni A, Giusti ME (2008) The remedies of the folk medicine of the Croatians living in Ćićarija, northern Istria. Coll Antropol 32(2):623–627

Pieroni A, Quave CL (2005) Traditional pharmacopoeias and medicines among Albanians and Italians in Southern Italy: a comparison. J Ethnopharmacol 101(1–3):258–270
Pieroni A, Nebel S, Quave C, Munz H, Heinrich M (2002a) Ethnopharmacology of liakra: traditional weedy vegetables of the Arbereshe of the Vulture area in Southern Italy. J Ethnopharmacol 81(2):165–185
Pieroni A, Quave C, Nebel S, Heinrich M (2002b) Ethnopharmacy of the ethnic Albanians (Arbereshe) of northern Basilicata, Italy. Fitoterapia 73(3):217–241
Pieroni A, Giusti ME, Münz H, Lenzarini C, Turković G, Turković A (2003) Ethnobotanical knowledge of the Istro-Romanians of Žejane in Croatia. Fitoterapia 74(7–8):710–719
Pieroni A, Quave CL, Giusti ME, Papp N (2012) 'We are Italians!': the hybrid ethnobotany of a Venetian diaspora in Eastern Romania. Hum Ecol 40(3):435–451
Prance G (2007) Ethnobotany, the science of survival: a declaration from Kaua'i. Econ Bot 61(1):1–2
Quave C, Pieroni A (2002) Magical healing. Traditional folk-medical practices of the vulture area of Southern Italy. Handbuch der Ethnotherapien/Handbook of Ethnotherapies, BOD, Norderstedt, Germany. pp 97–118
Quave C, Pieroni A (2005) Folk illness and healing in Arbereshe Albanian and Italian communities of Lucania, Southern Italy. J Folklore Res 42(1):57–97
Quave C, Pieroni A, Bennett B (2008) Dermatological remedies in the traditional pharmacopoeia of Vulture-Alto Bradano, inland Southern Italy. J Ethnobiol Ethnomed 4:5
Redžić S (2006) Wild edible plants and their traditional use in the human nutrition in Bosnia and Herzegovina. Ecol Food Nutr 45(3):189–232
Redzic S (2007) The ecological approach to ethnobotany and ethnopharmacology of population in Bosnia and Herzegovina. Coll Antropol 31(3):869–890
Redzic S (2010a) Wild medicinal plants and their usage in traditional human therapy (Southern Bosnia and Herzegovina, W. Balkan). J Med Plant Res 4(11):1003–1027
Redzic S (2010b) Wild mushrooms and lichens used as human food for survival in war conditions; Podrinje—Zepa Region (Bosnia and Herzegovina, W. Balkan). Res Hum Ecol 17(2):175–187
Rexhepi B, Mustafa B, Hajdari A, Rushidi-Rexhepi J, Quave CL, Pieroni A (2013) Traditional medicinal plant knowledge among Albanians, Macedonians and Gorani in the Sharr Mountains (Republic of Macedonia). Genet Resour Crop Evol 60(7):2055–2080
Šarić-Kundalić B, Dobeš C, Klatte-Asselmeyer V, Saukel J (2010) Ethnobotanical study on medicinal use of wild and cultivated plants in middle, south and west Bosnia and Herzegovina. J Ethnopharmacol 131(1):33–55
Šarić-Kundalić B, Dobeš C, Klatte-Asselmeyer V, Saukel J (2011) Ethnobotanical survey of traditionally used plants in human therapy of east, north and north-east Bosnia and Herzegovina. J Ethnopharmacol 133(3):1051–1076
Savikin K, Zdunic G, Menkovic N, Zivkovic J, Cujic N, Terescenko M, Bigovic D (2013) Ethnobotanical study on traditional use of medicinal plants in Southwestern Serbia, Zlatibor district. J Ethnopharmacol 146(3):803–810
Tomićević J, Bjedov I, Obratov-Petković D, Milovanović M (2011) Exploring the park-people relation: collection of *Vaccinium myrtillus* L. by local people from Kopaonik National Park in Serbia. Environ Manage 48(4):835–846
Zlatković BK, Bogosavljević SS, Radivojević AR, Pavlović MA (2014) Traditional use of the native medicinal plant resource of Mt. Rtanj (Eastern Serbia): ethnobotanical evaluation and comparison. J Ethnopharmacol 151(1):704–713

Part I
From Folk Medicine to the Medicinal Plant Trade

Chapter 2
Ways the Lukomir Highlanders of Bosnia and Herzegovina Treat Diabetes

Jonathan Ferrier, Lana Šačiragić, Eric C. H. Chen, Sabina Trakić, Ammar Saleem, Emira Alikadić, Alain Cuerrier, Michael J. Balick, John T. Arnason and Sulejman Redžić

Dedicated to the memory of Sulejman Redžić.

2.1 Introduction

Today, diabetes is a pandemic disease and a top health concern in indigenous societies. The global burden of diabetes was estimated to affect 366 million people in the year 2011; by 2030, 552 million people are expected to have diabetes (IDF

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2013). Type 2 diabetes (T2D; formerly called noninsulin-dependent or adult-onset diabetes) results from the body's ineffective use of insulin and is characterized by hyperglycemia. T2D is responsible for 90% of diabetes cases (Alberti and Zimmet 1998) and is linked to rapid social change, genetics, dietary acculturation, excess carbohydrate consumption, physical inactivity, and excess body weight (Young 1994; Hegele et al. 1999; Young et al. 1992, 2000; Ritenbaugh and Goodby 1989; WHO 2013a). The World Health Organization (WHO) estimated that Bosnia and Herzegovina (B&H) had 111,000 people with diabetes in 2000 and was expected to increase to 180,000 by 2030 (WHO 2013b).

Long-term complications of T2D include vascular disease, heart disease, stroke, neuropathy, retinopathy, cataracts, atherosclerosis, nephropathy, and impaired wound healing. Impaired glucose uptake affects the cells of organs that do not require insulin for glucose uptake (the nervous system, heart, kidneys, and small blood vessels). As a consequence, these cells have high concentrations of intracellular glucose during elevated hyperglycemic periods, resulting in impaired cell function and cell death (Ahmed 2005). These T2D complications are mediated by the formation of advanced glycation end products (AGEs), which are a therapeutic target with phytotherapies.

T2D incidence is three times higher in indigenous populations. These are some of the fastest-growing yet most vulnerable populations in the world that often lack culturally appropriate primary health care (Alberti et al. 2004; Ahmed 2005; Helin 2006). This is true for the Lukomir Highlanders of B&H, one of the last native communities in Europe, located in the Bjelašnica region of the Dinaric Alps (43.6°lat, 18.1°long, 1460 m.a.s.l.), southwest of the capital city Sarajevo. Local health authorities have described diabetes and heart disease as the most prevalent diseases in Lukomir (Ferrier et al. 2013). One reason for the prevalence of diabetes in Lukomir is due to a transition from traditional to higher-glycemic diets. Municipal water diversion was a driver for this transition in Lukomir. This recent postwar development project removed the source of water from Lukomir's cereal hydro mills, which in turn caused the collapse of the mills. This led to a nutrition shift from a traditional organic multigrain diet to a higher glycemic diet based on soft white wheat flour (Ferrier et al. 2013). This development has eroded the Highlanders' traditional lifestyle and exercise, transformed habitats of medical flora, and increased the prevalence of T2D.

Since Lukomir has no primary health-care facility, our objective was to identify the plants the Lukomir Highlanders use for the treatment of diabetes and highly associated symptoms. The plants were ranked using the syndromic importance value (SIV) function developed by Leduc et al. (2006) for a study of Cree traditional medicines. To assist future ethnobotanical studies, we present physician-ranked diabetes symptom weights (w) required for completing Leduc's SIV function. As a pilot pharmacology and phytochemistry study, we investigated the bioactivity and phytochemistry of one genus that was prominent in the Lukomir pharmacopoeia and cross-culturally used by our Eeyou Istchee Cree partners.

This ethnobotanical study of plants was conducted between 2007 and 2013 with the Lukomir community in Bosnia and Herzegovina, and J.F. and L.Š.'s organization, Cross-cultural Health Initiative (CHI). An international collaboration was developed with the Partnerships for Tomorrow Program, Phase II (PTP) funded by

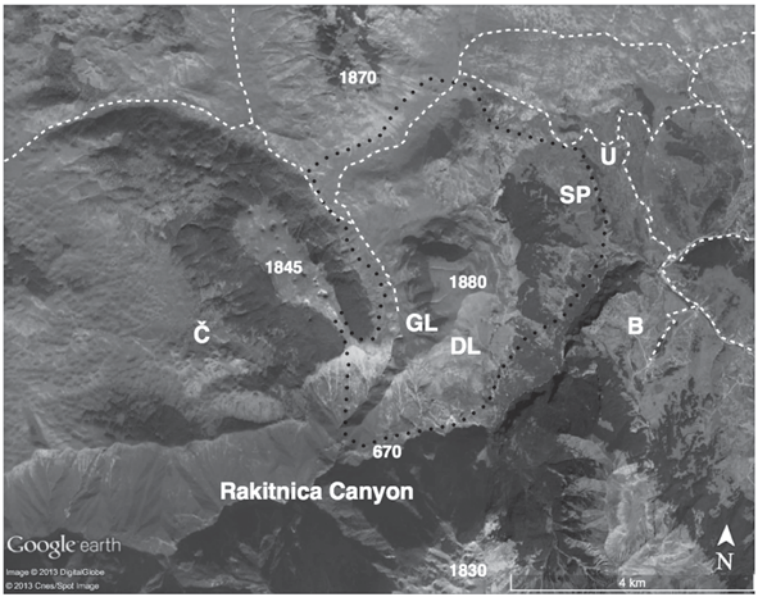

Fig. 2.1 Lukomir and nearby villages in the Bjelašnica region of Bosnia and Herzegovina. Taxa in Table 2.1 were collected within *black dotted perimeter* (~26 km^2). *White dashes* indicate roads leading to Lukomir. *Numerals* indicate meters above sea level (m.a.s.l.). Bobovica (*B* = 1300 m.a.s.l.), Čuhovici (*Č* = 1330 m.a.s.l.), Donji Lukomir (*DL* = 1250 m.a.s.l.), Gornji Lukomir (*GL* = 1460 m.a.s.l.), Studeni Potok (*SP* = 1420 m.a.s.l.)

the Canadian International Development Agency (CIDA). Members of CHI were hosted by the University of Sarajevo and Foundation GEA+. Research permits were issued by the Municipality of Konjic and University of Ottawa (H05-09-07), with prior informed consent from Lukomir's leaders and informants.

2.2 Methods

2.2.1 Field Research

2.2.1.1 Partnership, Permits, and Prior Informed Consent

This ethnobotanical study of plants was conducted between 2007–2013 with the Lukomir community in Bosnia and Herzegovina, and J.F. and L.Š.'s organization, Cross-cultural Health Initiative (CHI). An international collaboration was developed with the Partnerships for Tomorrow Program, Phase II (PTP) funded by the Canadian International Development Agency (CIDA). Members of CHI were hosted by the University of Sarajevo and Foundation GEA+. Research permits were issued by the Municipality of Konjic and University of Ottawa (H05-09-07), with prior informed consent from Lukomir's leaders and informants.

2.2.1.2 Study Site: Lukomir, Municipality of Konjic, Bosnia and Herzegovina

A consensus ethnobotany was conducted in the Bjelašnica area of the Dinaric Alps, in Lukomir, with the Lukomir Highlanders of Bosnia and Herzegovina (Fig. 2.1). This area is classified as an alpine biogeographic region that is closely bordered by Mediterranean and continental biogeographic regions (European Environment Agency (EEA) 2012). Many community members are descendants of a Bogomil lineage who first settled in *Donji Lukomir* (Lower Lukomir; 43.632 lat, 18.194 long, 1200 m.a.s.l.) and eventually moved to *Gornji Lukomir* (Upper Lukomir, commonly referred to as Lukomir; 43.637 lat, 18.182 long, 1460 m.a.s.l.). Lukomir's informants included spiritual leaders, elders, younger women, and men. Informants described plants on field trips, garden tours, while shepherding, or in comfortable settings of their choice. We earned our interview time with Lukomir's healers by volunteering our time to shepherd, harvest food, and stack hay. This allowed for participatory observation, and gave informants more time on field collection trips and interviews. Notes and photos were taken when participants displayed preparation methods of plant and natural product remedies.

Land mines were avoided by consulting with Bosnia and Herzegovina Mine Action Center (BHMAC; http://www.bhmac.org). All plants were collected on trail sides or in areas that were constantly traveled by sheep herds, since only parts of the Lukomir territory were surveyed by BHMAC.

Field work followed a quantitative consensus methodology with individual semi-structured interviews during which L. Šačiragić, J. Ferrier, and S. Redžić collected the following data: (1) specimen voucher number, (2) photo number, (3) common name, (4) scientific name, (5) family, (6) GPS coordinates, (7) altitude (m.a.s.l.), (8) habitat, (9) syntaxa, (10) flowering time and description, (11) medically active collection time, (12) use, (13) use category, (14) plant part used, (15) amount used, (16) preparation method, (17) administration method, (18) dosing regimen, (19) ethnographic details, (20) informant name, and (21) date. Determinations were made using a Domac's regional flora (1984), vouchers, and Tropicos.org (2013). Duplicate vouchers were collected (when sustainable) and are currently held at the University of Ottawa Herbarium (OTT) with voucher numbers reported in Table 2.1. There are plans for a herbarium in Lukomir to assist future botanical studies. Vouchers of this study will be placed in the Lukomir herbarium when available. Plant vouchers and an iPad (Apple, Cupertino, USA) were used to display collections to elders who could not venture over the mountainside, or for informant review purposes.

2.2.1.3 Elucidation of Plants for Diabetes Using Syndromic Importance Values

The SIV function was adapted from Leduc et al. (2006), Oubré et al. (1997), and McCune and Johns (2002, 2003). SIVs allow ranking of plant species by accounting for (1) the number of different symptoms for which a plant was cited, (2) the frequency of plant citation by individual informants, and (3) the association rank

Table 2.1 Taxa used by the Lukomir Highlanders to treat symptoms of diabetes. Dagger (†) indicates endemism. Determinations followed legitimate names in Tropicos.org (2013)

Scientific name	†	Common name	Symptom	V#	SIV
Achillea millefolium L.	–	Kunica	Diabetes	358	0.00725
Achillea millefolium L.	–	Kunica	Swelling or inflammation	358	0.00725
Anthyllis vulneraria L.	–	Ranjenik	Slow healing infections	372	0.00095
Asarum europaeum L.	–	Kopitnik, kopitnjak	Slow healing infections	382	0.00089
Capsella bursa-pastoris (L.) Medik.	–	Rustemača	Swelling or inflammation	398	0.00289
Cetraria islandica (L.) Ach	–	Islandski lišaj	Heart or chest pain	403	0.00192
Cichorium intybus L.	–	Konjanik	General weakness	411	0.00235
Cornus mas L.	–	Drijen	Slow healing infections	384	0.00089
Crataegus monogyna Jacq.	–	Glog, gloginje	Back or kidney pain	361	0.00553
Crataegus monogyna Jacq.	–	Glog, gloginje	Diarrhea	361	0.00553
Elymus repens (L.) Gould	–	Pirika	Heart or chest pain	389	0.00299
Elymus repens (L.) Gould	–	Pirika	Increased urination	389	0.00299
Equisetum arvense L.	–	Preslica	Back or kidney pain	367	0.00588
Equisetum arvense L.	–	Preslica	Swelling or inflammation	367	0.00588
Gentiana lutea L.	†	Lincura	Sore or swollen limbs	393	0.00257
Jovibarba hirta (L.) Opiz	†	Čuvarkuća	Slow healing infections	379	0.00363
Jovibarba hirta (L.) Opiz	†	Čuvarkuća	Swelling or inflammation	379	0.00363
Matricaria matricarioides (Less.) Porter ex Britton	–	Kamilica, Stomaklija	Diabetes	351	0.00775
Matricaria matricarioides (Less.) Porter ex Britton	–	Kamilica, Stomaklija	Swelling or inflammation	351	0.00775
Mentha longifolia (L.) L.	–	Nana	Swelling or inflammation	349	0.00428
Nepeta cataria L.	–	Macina trava	Swelling or inflammation	369	0.00321
Ononis spinosa L.	–	Gladišika	Increased urination	377	0.00115
Phyllitis scolopendrium (L.) Newman	–	Podrebnica (♂ or ♀)	Heart or chest pain	357	0.00259
Plantago lanceolata L.	–	Bokvica ♀	Heart or chest pain	359	0.00304
Plantago lanceolata L.	–	Bokvica ♀	Slow healing infections	359	0.00304
Plantago major L.	–	Bokvica ♂	Heart or chest pain	360	0.00304
Plantago major L.	–	Bokvica ♂	Slow healing infections	360	0.00304
Polygonum bistorta L.	–	Srčanik	Heart or chest pain	356	0.00266
Primula veris L.	–	Jagorčevina	Diabetes	373	0.00382
Prunus spinosa L.	–	Trnjina	Blurred vision	405	0.00428
Prunus spinosa L.	–	Rakija	Swelling or inflammation	405	0.00428
Rubus saxatilis L.	–	Kupina	Diabetes	407	0.00342
Salvia officinalis L.	†	Kadulja	Heart or chest pain	348	0.00296
Sambucus wightiana Wall. ex Wight & Arn.	–	Haptovina	Heart or chest pain	376	0.00192
Sambucus nigra L.	–	Zova, zobovina	Heart or chest pain	354	0.00266
Satureja montana L.	–	Vrijesak	Diabetes	366	0.00408
Sedum sexangulare L.	–	Zednjak	Slow healing infections	416	0.00086

Table 2.1 (continued)

Scientific name	†	Common name	Symptom	V#	SIV
Silene uniflora Roth ssp. *glareosa* (Jord.) Chater & Walters	†	Puca	Heart or chest pain	353	0.00741
Silene uniflora Roth ssp. *glareosa* (Jord.) Chater & Walters	†	Puca	Increased urination	353	0.00741
Silene uniflora Roth ssp. *glareosa* (Jord.) Chater & Walters	†	Puca	Slow healing infections	353	0.00741
Silene uniflora Roth ssp. *glareosa* (Jord.) Chater & Walters	†	Puca	Swelling or inflammation	353	0.00741
Silene uniflora Roth ssp. *prostrata* (Gaudin) Chater & Walters	†	Puca	Heart or chest pain	350	0.00741
Silene uniflora Roth ssp. *prostrata* (Gaudin) Chater & Walters	†	Puca	Increased urination	350	0.00741
Silene uniflora Roth ssp. *prostrata* (Gaudin) Chater & Walters	†	Puca	Slow healing infections	350	0.00741
Silene uniflora Roth ssp. *prostrata* (Gaudin) Chater & Walters	†	Puca	Swelling or inflammation	350	0.00741
Smyrnium perfoliatum L.	–	Ljaljica	Increased urination	380	0.00111
Solanum tuberosum L.	–	Krompir	Swelling or inflammation	408	0.00278
Symphytum officinale L.	–	Gavez	Slow healing infections	383	0.00089
Teucrium montanum L.	–	Iva	Diabetes	352	0.00487
Tilia platyphyllos Scop.	–	Lipa	Heart or chest pain	374	0.00215
Tussilago farfara L.	–	Podbijel (♂ or ♀)	Heart or chest pain	371	0.00215
Urtica dioica L.	–	Žara, kopriva	Heart or chest pain	362	0.00222
Urtica dioica L.	–	Žara, kopriva	Slow healing infections	362	0.00222
Vaccinium myrtillus L.	–	Borovnica	Diabetes	368	0.00480
Vaccinium vitis-idaea L.	–	Brusnica	Diabetes	385	0.00441
Vaccinium vitis-idaea L.	–	Brusnica	Slow healing infections	385	0.00441
Verbascum thapsus L.	–	Divizbina, divizma	Heart or chest pain	390	0.00200
Vitis vinifera L.	–	Sirce	Swelling or inflammation	409	0.00278

of symptoms for which a plant was cited to treat. Four physicians at The Ottawa Hospital, Ottawa, Canada, who diagnose and treat patients with diabetes, determined the latter association rank of symptoms. Symptoms were given a weight (w) from 1 to 4, where 1 is a symptom highly associated with diabetes; 2, moderately associated with diabetes; 3, weakly associated with diabetes; and 4 is not at all associated with diabetes:

Table 2.2 *Vaccinium* spp. and outgroup *A. uva-ursi* leaf samples collected in Jahorina, B&H, with IC_{50} expressed in $\mu g \cdot mL^{-1}$. All sample vouchers were accessioned at University of Ottawa, OTT

Sample	IC_{50}	Location	Alt. (m)	Date	Voucher	Extract #
V. myrtillus	4.1	Igman, B&H	984	July 1, 2005	417	BBE 134
V. myrtillus	5.4	Jahorina, B&H	1730	July 24, 2005	418	BBE 42
V. myrtillus	17.35	Jahorina, B&H	1730	July 1, 2005	419	BBE 133
V. myrtillus	27.8	Jahorina, B&H	1730	July 5, 2005	420	BBE 125
V. vitis-idaea	48.6	Jahorina, B&H	1730	June 5, 2006	421	BBE 23
A. uva-ursi	100.2	Jahorina, B&H	1735	June 15, 2006	422	ARC 1

$$\mathrm{SIV}=\frac{\left[\frac{\sum ws}{S}\right]+\left[\frac{\sum wf}{SF}\right]}{2}=\frac{\sum ws+\left[\frac{\sum wf}{F}\right]}{2S}.$$

The SIV function accounts for w, the weight of the symptom; s, the symptom treated by the species; f, the frequency of citation for the species; S, the total number of symptoms used for the survey (used in Leduc et al. 2006, but was not indicated in the denominator on the bottom right); and F, the total number of interviews in the survey.

2.2.1.4 Statistics and Phylogenetic Analysis

Statistical analysis was conducted using Prism 6 software. A phylogenetic tree was constructed using TreeGraph 2.0.47-206 beta, taxon with positive SIVs, and based on circumscription and topology presented by Angiosperm Phylogeny Group 3 (APG 3 2009) and the Linear Angiosperm Phylogeny Group 3 (LAPG 3; Haston et al. 2009).

2.2.1.5 Cross-Cultural Consensus

In collaboration with the Eeyou Istchee Cree and their Canadian Institute of Health Research Team for Aboriginal Antidiabetic Medicines (CIHR TAAM), we compared the Lukomir ethnobotanical taxa with the Cree CIHR TAAM's taxa (Leduc et al. 2006) to find consensus specimens for cross-culturally relevant pharmacological and phytochemical investigations. Both communities contain alpine and continental-type habitats and are isolated linguistically and geographically from each other.

2.2.2 Laboratory Research

2.2.2.1 Extraction of Consensus Specimen and Outgroup Leaf Material

Vaccinium spp. and outgroup *Arctostaphylos uva-ursi* (L.) Spreng. leaves were collected and identified by S. Trakić, S. Redzić, and J. Ferrier, and deposited at the OTT (Table 2.2). Samples were dried at 35 °C and ground in a Thomas Wiley mill (1 mm mesh). Plant material was extracted twice in ethanol/water (95:5 %) at room temperature for 24 h per phase. The phases were centrifuged at 1000 ×*g,* filtered, pooled, dried using a Speed Vac (Savant, Halbrook, NY), and lyophilized (Edwards Super Modulyo Freeze Drier, Fisher Scientific, Ottawa, Canada).

2.2.2.2 Inhibition of Advanced Glycation End Products by Consensus Genera Species

Inhibition of AGE formation was assessed as described by Farsi et al. (2008) with modifications. Bovine serum albumin (BSA; 1 mg mL^{-1}) was incubated with 100 mmol L^{-1} glucose/ 100 mmol L^{-1} fructose in sodium phosphate monobasic monohydrate buffer (pH 7.4) with extract (experimental treatment), ethanol/water (4:1) (negative control), or quercetin, an antioxidant against glycation by way of phenolic hydroxyl groups in the flavonoid structure (24 μg mL^{-1} in assay; Sengupta et al. 2006), which served as a positive control. To control for fluorescence of extracts, a treatment without BSA was included. To control for fluorescence of BSA, a treatment with BSA and vehicle was included. Stock solutions of extracts were serially diluted and tested at five concentrations that were optimized for dissolution and a linear concentration response (40, 20, 10, 5, and 2.5 μg mL^{-1} in well concentration). Three replicates were tested in sterile opaque polystyrene 96-well clear bottom plates (Corning Inc., New York, NY, USA). Plates were covered, sealed with Parafilm, and incubated for 7 days at 37 °C while shaking. Following incubation, fluorescence was measured using a microplate reader (SpectraMax M5; Molecular Devices, Sunnyvale, CA, USA) at excitation and emission wavelengths of 355 and 460 nm. Glucose/fructose and ethanol/water fluorescence was subtracted from all results, and percent inhibition and IC_{50} values were calculated as previously described (Farsi et al. 2008).

2.2.2.3 HPLC–MS Analysis of Vaccinium Species

Stock solutions of extracts were prepared to 10 mg mL^{-1} in ethanol/water (80 %:20 %) and filtered through a 0.2 μm PTFE nonsterile filter (Chromatographic Specialties Inc.). High-performance liquid chromatography (HPLC) analyses were performed using an Agilent 1100 chromatographic system (Agilent Technologies Inc.) consisting of an autosampler, quarternary pump, and diode array detector (DAD). Solvents were of HPLC grade (Fisher Scientific), and trifluoroacetic acid (TFA) was of

analytical grade (J.T. Baker). A Syngeri RP-Polar column (150 mm × 3 mm; 4 μm particle size) was kept at 53 °C and a flow rate of 0.5 mL min^{-1} was maintained. The mobile phase consisted of aqueous TFA (0.05 %; solvent A), acetonitrile with TFA (0.05 %; solvent B), and methanol (solvent C). Initial conditions were set at 95:5:5 % (A:B:C) and changed following a linear gradient of 5–9.2 % B and 5–17.5 % C in 25 min. The column was then washed by increasing solvent B to 100 % over 5 min and returned to initial conditions in the next 5 min. The column was allowed to re-equilibrate for 5 min, resulting in a total run time of 40 min. Ten microliters of each 10 mg mL^{-1} leaf extract were injected for each run, and the elution profiles were monitored at 350 , 280 , and 230 nm with bandwidth kept at 4.

Phytochemical constituents were identified based on comparison to retention times and ultraviolet (UV) spectra of pure standards (95 % purity) relative to a programmed library of known UV spectra, and further confirmed by mass spectrometry (MS) fragmentation patterns. Standard compounds used to monitor leaf extracts were (+)-catechin, chlorogenic acid, quercetin-3-O-glucoside, (Extra-synthèse), rutin, quercetin-3-O-rhamnoside (Sigma) paracoumeric acid, taxifolin, quercetin-3-O-galactoside, and myricetin (source unknown).

2.3 Results and Discussion

We were able to interview 25 informants who described plant uses on mountain and canyon field trips by volunteering to shepherd, collect food, and hay with the Highlanders between 2008 and 2010. Informants provided information on diabetic symptoms and did not initially provide any diabetes use reports, but during subsequent conversations on casual visits to Lukomir, many healers agreed that panacea remedies should be used to treat diabetes. Highlanders described eight panacea treatments, which were subsequently treated as a diabetes SIV use report.

All eight species used as "diabetes" treatments were cited as *čaj* (infusions). In one household's case, we noticed that some of these taxa were present in their *čaj* collection, but were not cited as medicine: *Teucrium montanum* L., *Salvia officinalis* L., and one specimen never mentioned, *Phyllitis scolopendrium* (L.) Newman, (*podrebnica*[1]). When we noticed this *čaj* collection, we asked why they were not mentioned. The response: "We drink *čaj* for our health." These plants were for their "medicine pot," that were prepared with a prayer after meal consumption. This household also has one family member with T2D managed by prescription medicines. Perhaps these plants are best referred to as Pieroni and Quave (2006) describe

[1] Redžić (2008) translated Podrebnica, "under the ribs," and explained that the name refers to the fern's sori aligned in a chevron-like pattern on the ventral side of the frond, which resembles a rib cage. This pattern spurred the doctrine of signatures for usage of *P. scolopendrium* as a treatment for ailments under the ribs.

them: “medicinal foods or food medicines”—prepared to obtain “medical action,” consumed in a “food context,” and in this case, not always cited as medicine.

The Lukomir Highlanders used 41 species for the treatment of diabetes symptoms (see Table 2.1). Antidiabetic reports (in parentheses) were of plants situated in five general habitats: grassland (21), village and shepherd trails (12), mountain slopes (9), riparian zones (6), rocklands (6), deciduous forest (4), and cultivated (2). Antidiabetic preparation methods were infusion (46), poultice (7), food (3), beverage (2), ear drops (2), juice (1), foot bath (1), eye wash (1), and tincture (1). The frequency of taxa to treat diabetes and associated symptoms were heart and chest pain (15), swelling or inflammation (13), slow healing infections (12), diabetes/panacea (8), increased urination (5), back or kidney pain (2), diarrhea (1), blurred vision (1), general weakness (1), and sore or swollen limbs (1).

The Lukomir Highlanders mentioned five endemic species (†, Fig. 2.2). Endemic taxa account for 20% of use reports: *Jovibarba hirta* (L.) Opiz (Crassulaceae), *Silene uniflora* ssp. *glareosa* (Jord.) Chater & Walters, *Silene uniflora* Roth ssp. *prostrata* (Gaudin) Chater & Walters (Caryophyllaceae), *Salvia officinalis* L. (Lamiaceae), and *Gentiana lutea* L. (Gentianaceae) were also listed as endangered (see Fig. 2.2).

2.3.1 Ways the Lukomir Highlanders Treat Diabetes and Associated Symptoms

In order to rank taxa from interviews with the SIV function, the weight (*w*) of diabetes and 15 associated symptoms were given association to diabetes values by four physicians: increased thirst (1), slow healing infections (1), increased urination (1.25), foot numbness or foot sores (1.25), blurred vision (1.75), diarrhea (2.25), heart or chest pain (2.25), abscesses or boils (2.25), frequent headaches (2.75), general weakness (2.75); increased appetite (2.75) and sore or swollen limbs (3); arthritis or rheumatism (3.25) and back or kidney pain (3.25); and swelling and/or inflammation (3.25) and diabetes (4).

SIVs of species were presented in Table 2.1. The top five SIV factors (in parentheses) belonged to *Matricaria matricarioides* (Less.) Porter ex Britton (0.0078), *Silene uniflora* ssp. *glareosa* (0.0074), *Silene uniflora* ssp. *prostrata* (0.0074), *Achillea millefolium* L. (0.0073), and *Equisetum arvense* L. (0.0059). Each species’ SIV was multiplied by 100,000 and presented as wedges to infer phylogenetic importance at various taxonomic levels (see Fig. 2.2). The top five families with the highest average SIVs were Caryophyllaceae (0.0074), Equisetaceae (0.0059), Asteraceae (0.0049), Ericaceae (0.0046), and Rosaceae (0.0044). Considering the factors and framework of the SIV function, families and genera in Fig. 2.2 with large SIV wedges have potential in delivering new medicines for diabetes. Furthermore, studies have indicated that targeting closely related taxa is a sufficient strategy for bioactivity screening (Cox and Balick 1994; Rønsted et al. 2008; Saslis-Lagoudakis et al. 2011). However, taxa that have strong phylogenetic signal (see Fig. 2.2) plus cross-cultural consensus have been demonstrated to contain more bioactive plants than random samples (Saslis-Lagoudakis et al. 2012).

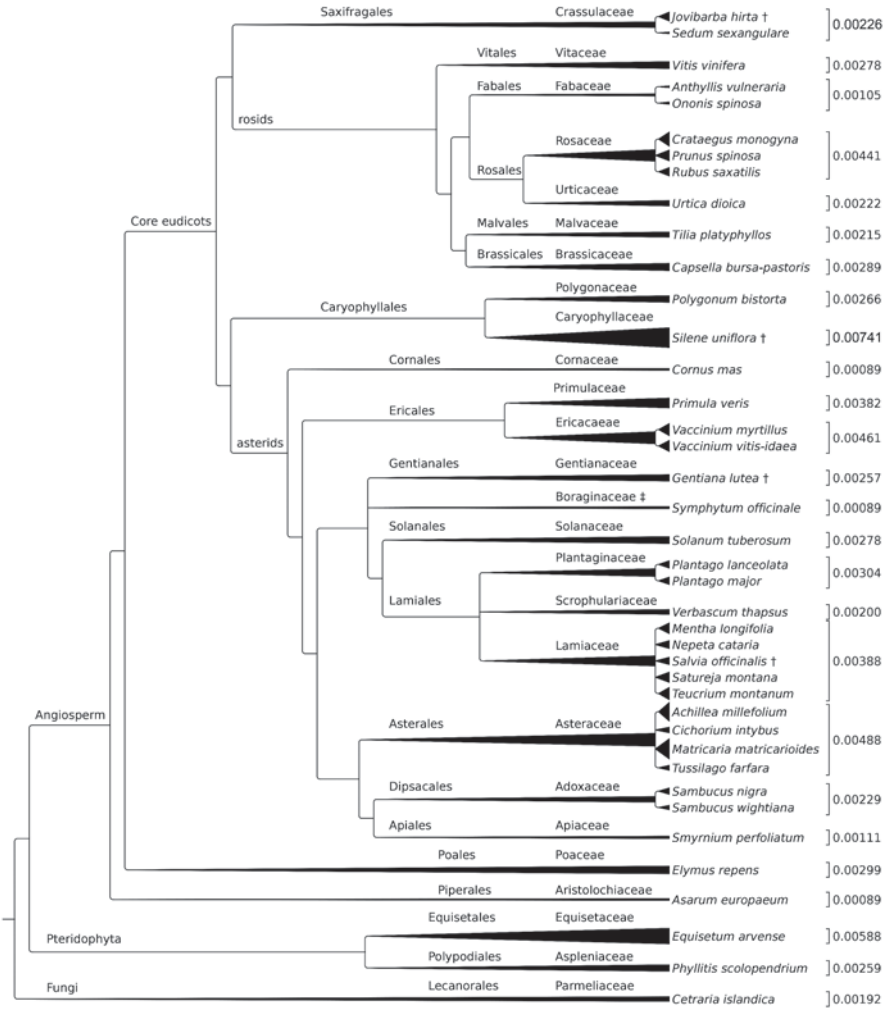

Fig. 2.2 Clustering of taxa used to treat diabetes and associated symptoms of diabetes. Average SIVs for each family are presented and *daggers* (†) indicate endemic taxa. *Double daggers* (‡) represent orders not delimited by the APG 3 (APG 3 2009). Topology is based on LAPG 3 (Haston et al. 2009). Branch lengths are not to scale

2.3.2 An Intriguing Cross-Cultural Consensus Among the Lukomir Highlanders and the Cree of Eeyou Istchee

Two consensus families emerged when Leduc's study (2006) was compared with Table 2.1: Ericaceae and Rosaceae. *Vaccinium* of the Ericaceae was the only genus with cross-cultural consensus. There was one consensus species, *V. vitis-idaea* L., which was used by three Cree healers and two Lukomir healers for slow-healing infections and urinary infections. *Vaccinium myrtillus* L. was used by four Highlander healers as a panacea. *V. angustifolium* Ait. was used by three Cree healers for

frequent headaches. SIV factors from Lukomir ranked *V. myrtillus as* 8/41 plants and *V. vitis-idaea as* 9/41 plants (see Table 2.1). SIV factors from the Cree survey ranked *V. angustifolium* as 11/15, and *V. vitis-idaea* as 13/15. SIVs indicate that *Vaccinium* spp. are more important for the Highlanders than the Cree for treating diabetes.

2.3.3 Inhibition of AGEs

Both *V. myrtillus* and *V. vitis-idaea* showed linear concentration-dependent inhibition of AGEs with activity higher or comparable to the positive control quercetin (see Table 2.2). *V. myrtillus* ($n=3$ at 50 μg mL^{-1} initial concentration and $n=1$ at 40 μg mL^{-1} concentration) had an average IC_{50} of 12.4 μg $mL^{-1,}$ and *V. vitis-idaea* ($n=1$) had an IC_{50} of 48.6 μg mL^{-1}. The data for the most active species, *V. myrtillus*, are shown (Fig. 2.3). *Vaccinium* spp. herein had approximately 61% greater activity than outgroup *A. uva-ursi* ($IC_{50=}$100.2 μg mL^{-1}). These results were comparable to $IC_{50's}$ from wild samples of *V. angustifolium* Aiton (McIntyre et al. 2009) ranging from 4.8 to 10.6 μg mL^{-1} with a seasonal mean of 6.3 μg mL^{-1}. *Vaccinium poasanum* Donn. Sm. was the most active taxon ($IC_{50=}$4.2 μg $mL^{-1)}$ in an environmental and date-controlled study consisting of numerous tropical specimens (Ferrier et al. 2012). Considering this comparison, and knowing that AGEs contribute to the development of retinopathy, cataracts, atherosclerosis, neuropathy, nephropathy, diabetic embryopathy, and impaired wound healing, the Highlanders' access to and use of *V. myrtillus* (Borovnica) is appropriate as a panacea remedy and may be an effective means of preventing AGE-related insults, which should be studied clinically.

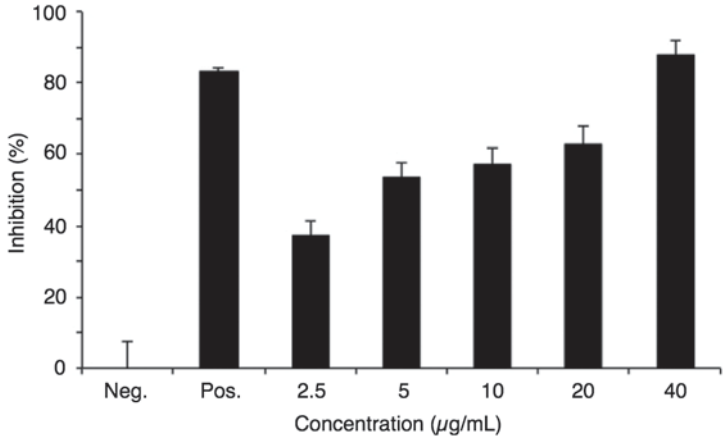

Fig. 2.3 Inhibition of advanced glycation end products by *V. myrtillu*s leaf extract. Half maximal inhibitory concentration (IC_{50}) equals 17.35 μg·mL^{-1}

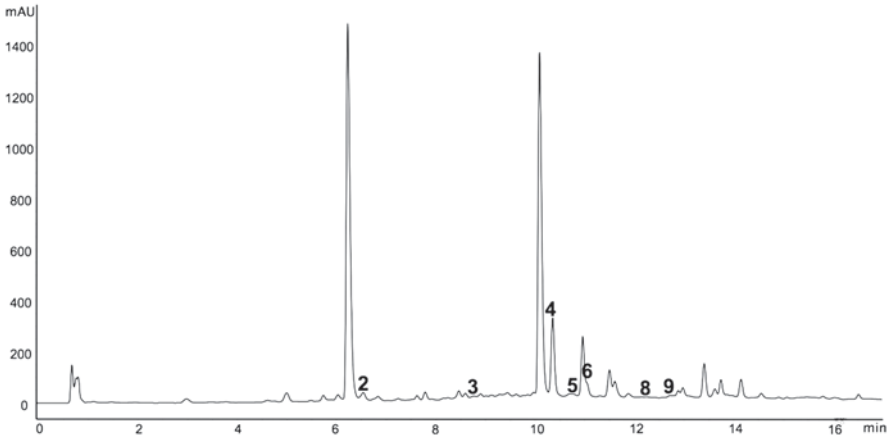

Fig. 2.4 HPLC chromatogram with DAD at 280 nm of *V. myrtillus* leaf sample. Numbers indicate presence of chlorogenic acid (*2*), para coumeric acid (*3*), taxifolin (*4*), quercetin-3-O-galactoside (*5*), quercetin-3-O-glucoside (*6*), quercetin-3-O-rhamnoside (*8*), and myricetin (*9*). Rutin and (+)-catechin were absent

2.3.4 HPLC–MS: V. myrtillus and V. vitis-idaea Markers

HPLC–MS analysis of *V. myrtillus* and *V. vitis-idaea* was compared with pure standards of (+)-catechin, chlorogenic acid, paracoumaric acid, taxifolin, quercetin-3-O-galactoside, quercetin-3-O-glucoside, rutin, quercetin-3-O-rhamnoside, and myricetin. Rutin was absent in both species (Fig. 2.4). *V. myrtillus* and *V. vitis-idaea* were separated based on the presence of (+)-catechin in *V. myrtillus* and quercetin 3-O-glucoside in *V. vitis-idaea*. All other metabolites identified were common to both species. Many of these compounds are good antioxidants and/or reported in other studies as active in antiglycation agents (McIntyre et al. 2009).

2.4 Conclusion

This study has identified species of interest for studies of complementary T2D medicines, while our analysis of *Vaccinium* spp. from Lukomir demonstrates the high activity of at least this genus and identifies its major constituents. There are both medicinal and many more food species utilized by the Lukomir Highlanders that remain to be studied. For example, phenolics and saponins likely play an important role in radical scavenging and cholesterol-binding activity in the Lukomir diet as they do in pastoral Maasai communities (Lindhorst 1998; Chapman et al. 1997; Johns et al. 1999). Eventually, clinical work is required to validate safe and effective use. Reinforcement or revival of traditional medicines and dietary plants

with antidiabetic activity is especially important in these remote communities where modern health care is limited but traditional complementary medicines are abundant.

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References

Ahmed N (2005) Advanced glycation endproducts—role in pathology of diabetic complications. Diabetes Res Clin Pract 67:3–21

Alberti G, Zimmet P, Shaw J et al (2004) Type 2 diabetes in the young the evolving epidemic. Diabetes Care 27:1798–1811. doi:10.2337/diacare.27.7.1798

Alberti KG, Zimmet PZ (1998) Definition, diagnosis and classification of diabetes mellitus and its complications. Part 1: diagnosis and classification of diabetes mellitus provisional report of a WHO consultation. Diabetic Med 15:539–553. doi:10.1002/(SICI)1096-9136(199807)15:7<539::AID-DIA668>3.0.CO;2-S

APG 3 (Angiosperm Phylogeny Group 3) (2009) An update of the angiosperm phylogeny group classification for the orders and families of flowering plants: APG III. Bot J Linean Soc 161:105–121. doi:10.1111/j.1095-8339.2009.00996.x

Chapman L, Johns T, Mahunnah RLA (1997) Saponin-like in vitro characteristics of extracts from selected non-nutrient wild plant food additives used by Maasai in meat and milk based soups. Ecol Food Nutr 36:1–22. doi:10.1080/03670244.1997.9991502

Cox PA, Balick MJ (1994) The ethnobotanical approach to drug discovery. Sci Am 270:82–87

Domac R (1984) Mala flora hrvatske i susjednih područja. Školska Knijga, Zagreb

European Environment Agency (2012) Natura 2000. Biogeographic regions of Europe. http://discomap.eea.europa.eu. Accessed 23 May 2013

Farsi D, Harris C, Reid L et al (2008) Inhibition of non-enzymatic glycation by silk extracts from a Mexican land race and modern inbred lines of maize (*Zea mays*). Phytother Res 22:108–112

Ferrier J, Djeffal S, Morgan HP et al (2012) Antiglycation activity of *Vaccinium* spp. (Ericaceae) from the Sam Vander Kloet collection for the treatment of type II diabetes1. Botany 406:401–406. doi:10.1139/B2012-026

Ferrier J, Šačiragić L, Redžić S et al (2013) The ethnobotany of the Lukomir highlanders of Bosnia & Herzegovina. Dedicated to the memory of Sulejman Redžić (1954–2013). Ph. D. Thesis, University of Ottawa, Canada

Haston E, Richardson JE, Stevens PF et al (2009) The linear angiosperm phylogeny group (LAPG) III: a linear sequence of the families in APG III. Bot J Linn Soc 161:128–131

Hegele RA, Sun F, Harris SB et al (1999) Genome-wide scanning for type 2 diabetes susceptibility in Canadian Oji-Cree, using 190 microsatellite markers. J Hum Genet 44:10–14. doi:10.1007/s100380050097

Helin C (2006) Dances with dependency: indigenous success through self-reliance. Orca Spirit, Vancouver

IDF (2013) The global burden. International Diabetes Federation. http://www.idf.org/diabetesatlas/5e/the-global-burden. Accessed 5 Jul 2013

Johns T, Mahunnah RL, Sanaya P, et al (1999) Saponins and phenolic content in plant dietary additives of a traditional subsistence community, the Batemi of Ngorongoro District, Tanzania. J Ethnopharmacol 66:1–10

Leduc C, Coonishish J, Haddad P, Cuerrier A (2006) Plants used by the Cree nation of Eeyou Istchee (Quebec, Canada) for the treatment of diabetes: a novel approach in quantitative ethnobotany. J Ethnopharmacol 105:55–63. doi:10.1016/j.jep.2005.09.038

Lindhorst K (1998) Antioxidant activity of phenolic fraction of plant products ingested by the Maasai. Thesis, McGill University

McCune L, Johns T (2003) Symptom-specific antioxidant activity of boreal diabetes treatments. Pharm Biol 41:362–370

McCune LM, Johns T (2002) Antioxidant activity in medicinal plants associated with the symptoms of diabetes mellitus used by the indigenous peoples of the North American boreal forest. J Ethnopharmacol 82:197–205

McIntyre KL, Harris CS, Saleem A et al (2009) Seasonal phytochemical variation of anti-glycation principles in lowbush blueberry (Vaccinium angustifolium). Planta Med 75:286–292. doi:10.1055/s-0028-1088394

Pieroni A, Quave CL (2006) Functional foods or food medicines? on the consumption of wild plants among Albanians and Southern Italians in Lucania. In: Pieroni A, Price Leimar L (eds) Eating and healing: traditional food as medicine. Haworth, Binghamton, pp 101–129

Oubré AY, Carlson TJ, King SR, Reaven GM (1997) From plant to patient: an ethnomedical approach to the identification of new drugs for the treatment of NIDDM. Diabetologia 40:614–617. doi: 10.1007/s001250050724

Redžić S (2008) The doctrine of signature use of *Phyllitis scolopendrium* (L.) Newman (Podrebnica)

Ritenbaugh C, Goodby CS (1989) Beyond the thrifty gene: metabolic implications of prehistoric migration into the New World. Med Anthropol 11:227–236. doi:10.1080/01459740.1989.9965995

Rønsted N, Savolainen V, Mølgaard P, Jäger AK (2008) Phylogenetic selection of *Narcissus* species for drug discovery. Biochem Syst Ecol 36:417–422. doi:10.1016/j.bse.2007.12.010

Saslis-Lagoudakis CH, Klitgaard BB, Forest F et al (2011) The use of phylogeny to interpret cross-cultural patterns in plant use and guide medicinal plant discovery: an example from *Pterocarpus* (*Leguminosae*). PLoS ONE 6:e22275. doi:10.1371/journal.pone.0022275

Saslis-Lagoudakis CH, Savolainen V, Williamson EM et al (2012) Phylogenies reveal predictive power of traditional medicine in bioprospecting. Proc Nat Acad Sci U S A 109:15835–15840. doi:10.1073/pnas.1202242109

Sengupta B, Uematsu T, Jacobsson P, Swenson J (2006) Exploring the antioxidant property of bioflavonoid quercetin in preventing DNA glycation: a calorimetric and spectroscopic study. Biochem Biophys Res Commun 339:355–361. doi:10.1016/j.bbrc.2005.11.019

Tropicos.org (2013) Tropicos. Missouri botanical garden. http://www.tropicos.org/. Accessed 10 Aug 2013

WHO (2013a) World health organization. Diabetes fact sheet no 312

WHO (2013b) Prevalence of diabetes in the world health organization European region. http://www.who.int/diabetes/facts/world_figures/en/index4.html. Accessed 30 Jun 2013

Young TK (1994) The health of native Americans: toward a biocultural epidemiology. Oxford University Press, New York, pp 145–168

Young TK, Schraer CD, Shubnikoff EV et al (1992) Prevalence of diagnosed diabetes in circumpolar indigenous populations. Int J Epidemiol 21:730–736

Young TK, Reading J, Elias B, O'Neil JD (2000) Type 2 diabetes mellitus in Canada's first nations: status of an epidemic in progress. Can Med Assoc J 163:561–566

Chapter 3
Hungarian Ethnobotanical Studies in Romania

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3.1 Introduction

Ethnobotany is an integrative, multidisciplinary science that encompasses botany, linguistics and ethnography, and deals with the traditional knowledge about plants and the natural environment (Szabó 1976). Ethnobotany focuses on the manifold relation between people and plants, relying on the work of several researchers, such as biologists, pharmacists, physicians, anthropologists, ethnographers and linguists. Their different interests, hypotheses and questions reflect the various aims and roles of each discipline. The botanist is interested in the effect of the people on the flora and in their relation. The linguist deals with the source and development of plant terminology, while the ethnographer studies the traditional role of plants in folk art and folk poetry, their use in local ethnomedicine and as food or children's toys, for example (Hoppál 1990; Pócs 1990; Szabó 1990; Rácz 2000; Zsigmond 2005).

This research field has a strong history in Transylvania, which has been part of Romania for a long time. Here, we discuss the ethnobotanical surveys conducted by Hungarians living in Romania between the sixteenth and eighteenth centuries and then explore the data collected in ten regions of the country based on the ethnobotanical inventories performed from the 1930s (Fig. 3.1).

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Fig. 3.1 Study areas of ethnobotanical surveys in Romania (Source: http://www.freeworldmaps.net/europe/romania/map.html)

3.1.1 Preliminary Studies from the Sixteenth and Eighteenth Centuries

The first works in Transylvania were documented as herbal books. The medical–botanical handbook *Herbarium* of Péter Melius Juhász from 1578 was published six years after the death of the author with the support of Gáspárné Heltai, the leader of the printing house in Cluj-Napoca. The work relies heavily on various handbooks from other countries as sources, and summarizes the features of 627 plant taxa, including their habitats as well. Altogether, 480 species were identified, including 138 plants that are currently known (e.g., mints bearing the name polaj). This herbal book played an important role in its era as a sample work, which was followed by publishing several new Hungarian volumes. The Herbarium was reedited and supplemented with an essay and comments in 1978, when the work was 400 years old. Balázs Szikszai Fabricius (Kovács), a teacher in Cluj, has prepared a Latin–Hungarian glossary in this work with several botanical data, which reflects the wide botanical knowledge of the author (Szabó 1978).

The medical work that followed is the *Ars Medica* by György Nagyváradi Váradi Lencsés, which has been preserved in handwritten form in the Teleki Library of Targu Mures. Between 70 and 80% of medicines in this work are of plant origin. The manuscript was prepared between 1570 and 1593 in Alba Iulia, and was first

copied by Máté Patai (a physician) between 1610 and 1612 in Oradea, and then by the commission of the Baroness Kata Wesselényi with the title *Ars Medica* in Sângeorgiu de Pădure in 1757. The original manuscript was copied by Béla Varjas between 1940 and 1943 under the title *Hungarian Medical Book from the 16th Century,* which was edited incompletely as a book in Cluj and destroyed in World War II (Varjas 1943; Szabó 1978).

In *Pax Corporis*, the seventeenth-century work of the physician Ferenc Pápai Páriz, several medicinal plants were described with the vernacular name, habitat and traditional use (Pápai Páriz 1690).

In the eighteenth century, the famous garden of József Benkö in Aita Medie was documented simultaneously with the botanical garden of the University of Trnava and Budapest (Gazda 1999). In the country, József Benkö was the first follower of Carl von Linné: He mentioned several plants in a funeral oration, and 4 years later, he reviewed the taxonomy of Linné in footnotes of a work published in Sibiu. This is the first edited work of the morphological terminology in Hungarian (Benkö 1781). His first Latin manuscript about the local flora, the *Flora Transsylvanica* (Benkö 1778) has disappeared, while Benkö sent it to Göttingen (Ernyei 1932) to print, but its significance can still be documented by the citations of contemporaries and followers. The *Transsilvania Specialis* consists of the flora of Micloşoara and Covasna, and lists several curiosities such as *Angelica archangelica* L., *Chimaphila umbellata* (L.) Barton, *Lysimachia thyrsi-flora* L., *Marsilea quadrifolia* L. and *Sison amomum* L. (Benkö 1778). The manuscript, which was thoroughly investigated by Gábor and Erzsébet Johanna Rácz (Rácz and Rácz 1972), was edited later in the form of a book as well. The following work of Benkö from 1783 contains about 1000 plant names in Latin, Hungarian, German and French, supplemented by the vernacular names in Hungarian (mostly from the Székler folk terminology), in Romanian and German, as well. Notably, Benkö was the first who referred to the Romanian origin of some Hungarian words in the plant names, such as in the case of the local name szkumpia of *Rhus hirta* (L.) Sudworth in Aita Medie (Benkö 1796). In addition, he played a significant role in coining the names of several taxa, such as *alacsony füzény* (*Lythrum hyssopifolia* L.), *havasi harangrojt* (*Soldanella alpine* L.), *nefelejcs* (*Myosotis* sp.) and *árvalányhaj* (*Stipa* sp.) (Vörös 2008).

3.2 Study Areas in Transylvania

3.2.1 Bucovina

Bucovina is found in the northern part of Romania (see Fig. 3.1). The Széklers from Dornești migrated to Falschnone and Varaždin in the 1940s and to Érd in the 1960s. The migrant people and their descendants were interviewed ethnobotanically, and the results were published in a series consisting of four articles (Grynaeus and Szabó 2002). In this work, 200 plant taxa were characterized by the data of their origin (which was important because of the migration), the vernacular and scientific

name compared with the data of the Ghimes mountain and the way of use reciting the informants word for word. After the vernacular names, the monograms of the informants can also be found. Various plant species were mentioned in medical treatments, as device, handicraft, children's toy, food and ornamental plant, too. In the last paper of the series, the unidentified plants, the sacramentals and several terminological data were detailed with their origin from the Bible or from the name of certain diseases and animals.

In another work concerning the ethnobotany in Bucovina, more than 200 groups of diseases in human medicine and veterinary were mentioned in alphabetical order with treatments, citations, study area, glossary and index, as well (Sebestyén 2008).

3.2.2 Moldova

The Moldovan Csángós living in the northeastern part of the country preserve significant traditions, cultural and historical values even today, which can be attributed to their ethnic isolation. Among the ethnobotanical field trips in this region, firstly the works dedicated to the Csángó's botanical folk terminology can be mentioned (Csüry 1933; Halászné 1987). A large-scale survey was carried out in 12 villages between 1970 and 1976, involving 103 plants with 191 local names, various ways of administration (e.g., tea=*csáj*, bath=*feredö*), treatments, as well as verbatim citations (Halászné 1981). Another work deals with 24 taxa used for external injuries, dislocations and burn wounds, comparing these data with the knowledge of the people in the Ghimes and with the data of a medical book from Gelence published in the eighteenth century (Halászné 1993). The latter book is based on the 150-year-long experience of rural people, listing 99 herbal home remedies and 211 contemporary prescriptions, including data similar to those in Moldovan ethnomedicine, such as in case of *Achillea millefolium* L. and some *Plantago* species.

Péter Halász has studied this region for 40 years and published several papers and three volumes presenting numerous data about mystic elements, beliefs, prediction, interpretation of dreams and magical numbers connected to plants, as well as about the archaic and traditional livestock keeping of the Csángós (Halász 2007, 2010). The reference book includes plant species used in ethnomedicine, as fodder, food, sacramental, as well as in construction, in folk songs and as motifs on various textiles, completed by glossary and index.

Further botanical data for this area were reported by researchers like Diószegi (1960). Data were discussed mostly according to the diseases mentioned (Kocsis 2010), associated with magical elements and beliefs (Bosnyák 1973; Csoma 2000), or with healing practices (Lakatos 2000). Several taxa used for dyeing wool (e.g., *Alnus glutinosa* (L.) Gaertn., *Juglans regia* L., *Malus sylvestris* (L.) Mill) were documented, listing the used plant parts, the dyeing process, other used materials (e.g., vinegar, alum) and the dyed colour (Kobzos 1999).

3.2.3 Maramureş

In the northern part of Romania, the botanical survey of Târgu Lăpuş has provided several data related to food, aromatic and ornamental plants of the region, supplemented by ecological features of the vegetation (Mihalescu et al. 2010). In a monograph, Géza Kóczián has published traditional data about the use of and beliefs related to *Atropa belladonna* L. in this area (Kóczián 1990).

3.2.4 Ţara Călatei

This region, inhabited by Hungarians and Romanians, consists of three main parts: Felszeg, Alszeg and Nádasmente. In the first study, Kovács (1976) documented altogether 71 plant species, some animals and other substances used for various ailments. The healing methods were accompanied by peculiar magical elements and beliefs, presenting the actual way of thinking and ideology of the informants about the known diseases. Among the other ethnobotanical inventories in this area, the work of Kóczián et al. (1977) can be mentioned. Further data were listed about the local name and means of administration of 108 medicinal, wild, dyeing and cultivated plants collected from eight villages (Szabó 2002).

The results of the field work conducted in the region were summarized in the joint works of the botanist Attila Szabó and the linguist János Péntek (Szabó and Péntek 1976; Péntek and Szabó 1976a, 1980). Their ethnobotanical guide classified the plants into groups according to their habitat, provided the local names of 500 plant taxa and reviewed the basic methodology of plant collection and documentation (Péntek and Szabó 1985). The authors have documented the relief, landscape, climate, vegetation and relationship between plants and culture in Ţara Călatei. They surveyed the traditional knowledge of people with questionnaires containing 1000 questions about the use, beliefs, role as symbols and linguistic data of the wild herbaceous, woody and ornamental plants of the plants living in the field or in kitchen garden, and of the fungi. The wild species mentioned in the interviews with 251 informants were listed according to the flora elements, but the division of the cultivated taxa was based on the life strategy, the type of the production, as well as the time and features of the domestication. The book was supplemented by a Hungarian and Romanian index.

Several horticultural and linguistic data were documented in the region (Péntek 1980), but the actual role of nature in the everyday life of people was reported in the work of Samu Vasas (Vasas 1985), highlighting the plants used in human medicine and in the veterinary practice. Further studies report data about the plants occurring in the geographical nomenclature (Péntek and Szabó 1980; Péntek 1997), about the folk terminology of the vegetation types and their species (Péntek 2003), as well as about the appearance of anthropomorphisms (Péntek 1982, 1984).

In four settlements of Borsa valley, Aurél Vajkai discussed the relationship between the healing persons and the community, describing 122 plants together with

their herbal products (Vajkai 1943, 2003). Related to the flora of this area, altogether 509 taxa were documented in the Malom valley near Cluj-Napoca. This work evaluates the species according to their life strategy and ecological characters on ecodiagrams (Csürös and Csürös 1996).

3.2.5 Ghimes

The Ghimes valley along the Tatros River includes elements from both the Csángó and Romanian culture. The inhabitants of the three settlements of the valley (Lunca de Sus, Lunca de Jos, Ghimeş-Făget) preserve archaic and valuable knowledge about the plants. In Transylvania, the first ethnobotanical inventory was published from this area (Holló and Rácz 1968). Mária Antalné Tankó has summarized plant species according to the disease types, providing plant list together with the peculiar dialects of the region (Antalné 2003).

In the 1970s, various plants, animals and other substances were recorded in Lunca de Jos and in Trei Fântâni (Kóczián et al. 1975, 1976; Szabó 2002). The first study reports plants used for 11 and 12 disease types in human medicine and veterinary, respectively (Kóczián et al. 1975). In addition, the authors have described 86 plant taxa with vernacular names and ways of administration (Kóczián et al. 1976).

In addition to Lunca de Jos, further ethnomedicinal surveys were carried out listing 170 plant taxa with 182 local names (Frendl and Balogh 2004, 2006). In these studies, the use of analogy in human thinking was highlighted. In the case of colour analogy, the colour of the used plant parts is associated with the nature of the disease or the method of administration (e.g., the yellow root of *gyertyagyükerüfü—Gentiana asclepiadea* L. for jaundice). In the name analogy, the local plant names cover the traditional use (e.g., *vérburján* or *blood herb—Hypericum perforatum* L. used for bleeding). The authors mention medicinal and food plants with anthropomorphic features and beliefs, too.

A peculiar collection was also published from Lunca de Jos: Based on the diary of a Csángó shepherd Berta Tankó Mónus, the elements of traditional livestock keeping and plant production were summarized, supplemented by the events of her everyday life, prediction of the weather, beliefs, customs and folk songs, illustrated with the citations of the informant word for word (Bakay and Harangozó 2007).

The study of the ethnobotanical values of Ghimeş-Făget was launched at the end of the 1970s. Tankó and Ilyés (1978) published only the local names of the plants of the village. In the following work, based on 36 interviews, altogether 146 wild and 104 cultivated plants were divided into the following groups: herbaceous plants living in meadows, forests, water and on the edge of rivers, woody, fruit-bearing and ornamental plants, weeds, as well as taxa from the kitchen garden. The plants were characterized by their use in ethnomedicine, as food, construction material or in handicrafts (Rab et al. 1981). In a complementary field work, the authors reported medicinal data about 58 plant species in 120 forms for 11 human diseases and in the veterinary practice, too (Rab 1982).

Although Lunca de Sus is provided by permanent medical service and pharmacy, people still know and use medicinal plants at present. In our preliminary work, 170 plants and 13 fungi were documented with local names, from which 115 taxa are of primary importance in the ethnomedicinal treatments (Papp et al. 2009a; Papp 2011). This survey was completed by several microbiological analyses of the leaf extract of *Pyrus communis* L., which was mentioned in the settlement (Fancsali 2010).

Pál Pálfalvi discussed taxa according to the habitat, life strategy, ecological needs, protection and taxonomy of plants living in 500 y (Pálfalvi 1995). In his field work, based on the botanical and ethnobotanical history of the region, the main publications were illustrated on a map with the time and place of publishing, highlighting the most important plants of the 800 taxa mentioned by 200 informants in 20 vegetation types (Pálfalvi 2001).

As a new research field in the area, ethnogeobotanical surveys have been carried out since 1999, including both anthropological and botanical studies. These inventories consisting of the topography of the flora and the plant habitats can provide data for planning conservation, based on the experience of rural people (Molnár and Babai 2009). Ethnoecology consists of landscape use and the ecological knowledge of people, while ethnobiodiversity studies the evolution of the species, the linguistic elements, as well as cultural and historical values. Altogether, 172 taxa were mentioned with 235 vernacular names and with the assignment of the correct source of the local knowledge. These data refer to the abundance and change of the local flora, to the habitat of the plants, to the taxonomical peculiarities and to the exact folk experiences about the landscape (Babai and Molnár 2009; Molnár and Babai 2010).

3.2.6 Uz Valley

In this region, the sporadic farms have been inhabited by Csángós since the twentieth century, who work in agriculture as self-providers, supplemented with preparation of dairy products (Frendl and Kripner 2005). The two main villages—namely Cinod with 200 people and Egershec with 100 inhabitants—are not provided either by permanent medical service, pharmacy or post office. Based on their isolation, they know, collect and use the plants from their environment regularly, complemented by animals and other (e.g., human) materials. In our collection work, among the 180 described plant species, 105 taxa were mentioned in human ethnomedicine (Papp et al. 2011) and in veterinary (Frendl et al. 2007). With respect to the horticultural customs, several herbs and ornamental plants were observed and recorded with their used parts and ways of administration (Papp et al. 2011a, 2013).

3.2.7 Gheorgheni

Gheorgheni, located in the northern part of Romania, was surveyed by János Rab for 17 years, who performed botanical, ethnobotanical, geographical, ethnographical,

linguistic and historical studies in the area. In his book, he summarized the local vegetation types, terminology, uses and the beliefs concerning the wild and cultivated plants (Rab 2000), similarly to a further study about the local flora (Rab et al. 1980). In a case study, Rab considered ethnogeobotany as a subsidiary science of ecology, supported by several examples from the local vegetation (Rab 1993).

A study concerning wild plants and fungus discussed a tinder fungus and 18 woody plants and shrubs, used as devices and as food in indigency. For example, the bitter fruit of the *belekenyér* (*Sorbus aucuparia* L.) or the berries of the *bodzafa* (*Sambucus nigra* L., *S. ebulus* L., *S. racemosa* L.) were consumed in the poverty-stricken period in the region (Tarisznyás 1978).

3.2.8 Depresiunea Plăieşi (Caşin)

In the eastern region of Romania, an ethnobotanical inventory of 23 wild and 47 cultivated plants was carried out in three villages, namely Imper, Caşinu Nou and Plăieşii de Jos. Altogether, 26 taxa were reported to be used in human medicine and 10 in ethnoveterinary, providing several vernacular names, indicating the study area and the name of the informants (Pintér et al. 1974).

3.2.9 Câmpia Transilvaniei

This region, located southeast of Ţara Călatei, is famous for its traditional folk music and dance. In the village of Colonia, 150 ailments were reported to be treated via local means. The healing persons are mostly the women dealing with the collection and use of medicinal plants, and with the curing process of the inhabitants of the settlement. The author listed some minerals, human materials, animals and other substances, as well as 73 plants belonging to the fruit-bearing, wild woody taxa and shrubs, wild and cultivated herbaceous plants, completed by the used devices and mentioned beliefs connected to the transmission of the diseases. This work forms a true notion of the actual condition of ethnomedicine, and of the relation between the elderly and the young in the village (Keszeg 1981).

3.2.10 Széklerland

The present area of Széklerland consists of the counties Harghita, Covasna and Mureş. The region is widely known for its historical, ethnographical, cultural and botanical value. The medicinal and aromatic plants of Harghita were summarized in a volume with the Hungarian, scientific and vernacular names completed by their ethnobotanical data and method of administration (Csedő 1980).

The process of the traditional sap tapping of *Betula pendula* Roth. was studied ethnobotanically and ethnographically in the work of Györffy (1937). The sweet sap called "*virics*" can be extracted from the trunk of the tree in spring and used for various diseases (e.g., for kidney problems or pneumonia). These methods of the extraction using special devices are disappearing today.

The local flora and vegetation of the region were surveyed in terms of coenological, floristical, medicinal and ecological aspects from the eighteenth century (Kovács 1997). Among the monographs, data were published about the use of *Picea abies* (L.) Karst.: the woody parts can be applied in handicrafts, in charcoal-burning, as constructive elements or firewood, whereas the resin ("*szurok*") is useful for soaps and as child food in chewed form (Csergő 1978). The use of the bark of other pine species was described in devices and in tanning, while the resin and the cone ("*csencsók*") for wounds (Kisné 2006). The endemic *Quercus* species were studied for the vegetation and linguistics data, and for their use in devices and furniture (Kovács 2009).

The people living in the farms of Varşag have traditional customs related to the use of fruit-bearing and ornamental plants, vegetables, local foods and teas, as well as to local celebrations. In this field study, more than 100 medicinal plant taxa, some animals and human materials were interpreted, used in different forms for various diseases (Mészáros 1998).

People have regularly used the work *Pax Corporis* (Pápai 1690) in their everyday life in Neaua. This work presents the curing persons and their methods: For example, some people specialize in tooth extraction or massages. The 40 treatments were listed with the correct citations of the informants, mentioning herbal materials and preparations from the pharmacy, as well as peculiar beliefs and data of homeopathy (Zillmann 1997).

In Aiud, 17 local food plants were summarized based on the method of their collection, used parts and prepared dishes. Detailed data were introduced in a case study about the use of *Carum carvi* L. as soup, tea, brandy and spice in various foods (Vita 1994). In Lopadea Noua, by Aiud, altogether seven groups of diseases were documented based on the citations of the informants, underlining some special disappearing methods and beliefs, such as the tin alloy and the use of "*coal water*" against bad spirits (Sipos 2010).

Vlăhiţa and Căpâlniţa were studied for the use of 171 plant species mentioned under 257 vernacular names. Beside the rational data, neither beliefs nor magical words were detected in these villages (Frendl 2001).

In Şiclod, which is located on the border of Harghita and Mureş counties, rural people use only rational elements in ethnomedicine without runes or beliefs (Balázs 2010). Collected plant taxa and other home remedies are no longer used in human medicine, while in the veterinary field, drugs and remedies are still applied today. Recently, the archaic knowledge has been increasingly influenced by the use of various books and media sources, and by the knowledge of the families coming from Hungary. Taking into consideration both sources, in her work, the author presents the actual medicinal knowledge of the people in Şiclod.

Depresiunea Ciucului in Harghita county can be divided into three main parts—namely, Felcsík, Középcsík and Alcsík. The vegetation of the county was studied for the flora elements, for the ecological features and for the agricultural occupations (Csürös et al. 1980). Miklóssy studied 47 settlements in the area with ethnobotanical questionnaires directed at the use of wound-healing taxa and of 68 dyeing plants with the detailed dyeing process including predyeing and drying (Miklóssy 1978). The majority of the collected 24 astringent species is used as foment—for example, the fresh leaves of *zsanika* (*Alchemilla vulgaris* L.), the tepals of *Lilium candidum* L. or the resin of *Picea abies* (L.) Karst. These plant materials were supplemented by 13 ointments containing, for example, flour, honey, wax or sour cream used against bleeding (Miklóssy 1980). Also in *Depresiunea Ciucului*, the ethnobotanical surveys of Sândominic and Racu reported numerous irrational and magical elements, introducing the possible causing agent of the diseases, the special healing persons and their unique medicinal treatments with an index and a data store (Pálfalvi 1999; Kosz 2010).

The valley of the Târnava Mică and Corund stream is famous for salt mining. In the surveyed villages of the valley, 99 herbaceous and 41 woody taxa, as well as 11 wild flowerless plants were documented based on the interviews with 600 informants by Gub (Gub 1993, 1996). More than 100 cultivated species including agricultural, horticultural, fruit-bearing, exotic and ornamental plants were applied in 71 local treatments. As for medicinal plants, 121 taxa were mentioned in 12 home prescriptions and preparations for various diseases. For example, against external injuries, 52 plants and a tinder species (*Fomes fomentarius* (L.) Fr.) were applied as foment, ointment or plaster soaked in alcohol or boiled with fat, and used with vinegar, honey or bacon (Gub 1991, 1998). The author reported several data about folk customs, beliefs and weather prognosis connected to the plants of the region (Gub 1994), the vegetation types and the protected flora elements, as well as the local use of the salty water of the region (Gub 2001, 2003). As a unique trade all over the world, in Corund the traditional processing of tinders was presented in a volume for devices, huts and ornaments, including the collection and preparation of these fungi with several illustrations (István and Szőcs 2008).

Along the river Kis-Homoród, ethnobotanical study of Lueta was started six years ago. The settlement has had access to a local pharmacy since 2008 and medical service from the neigbouring village 2 days a week (Papp et al. 2009b; Papp 2011). Among the described 220 taxa, 143 medicinal plants were mentioned in their curing methods with 355 vernacular names for 102 diseases (Boris 2010; Papp et al. 2011b). In addition, the food and ornamental plants, the fungi, as well as the used animals and human materials were reported in the village (Erdei 2011).

Among the other settlements along the Kis-Homoród, Crăciunel has neither a pharmacy nor permanent medical service; therefore, people use medicinal plants regularly in home remedies. The listed 92 herbs among the reported 175 taxa were summarized according to their habitat, used parts, storage and preparation form (Papp and Horváth 2013).

Although Trei Scaune was formerly treated as a separate county, it covers the whole area of Covasna today. An ethnobotanical survey was performed in a

settlement (Araci) of the region, providing information on 207 wild and 171 cultivated plants covered by 535 local names. In addition, 15 fungi and moss species were also documented. The work lists the role of plants as food, fodder, medicinal or dyeing taxa with their symbolic role, as well as the species newly discovered or becoming rare (Péntek and Szabó 1976b). A separate study was published about "*nagyerejü fü*" (*Atropa belladonna* L.), its traditional use and related beliefs in the region (Kakas 1973).

A summary of the flora of Covasna was published by Rácz and Füzi, and it reviewed the scientific and local terminology of plants, the characters of the habitats, the method and the recommended quantity of the collection yearly, the used parts and the way of administration of the listed species (Rácz and Füzi 1973). In the same county, some studies were published related to plant growing and other agricultural activities (Zakariás 1995), and to the ethnobotanical values in eight settlements, presenting data about 169 plants, some animals and other materials (e.g., bacon, honey and tallow) used for 20 disease types (Bartha et al. 2011; Bartha 2013).

3.3 Conclusion

The first Hungarian ethnobotanical studies were published in the sixteenth century in Transylvania, a significant part of Romania, followed by several medicinal and herbal books, contemporary manuscripts and scientific articles until present day. Recently, lifestyles have changed in the selected regions significantly, due in large part to the migration of the local youth to city centers or abroad. Moreover, changes in their interest and a new focus on official medicinal data of the scientific books and media sources has also influenced this decline in reliance on traditional knowledge on local taxa. These factors influence the preservation, transmission and maintenance of the ancestral ethnomedicinal data in Transylvania. In accordance, the elderly are considered as the most authentic and true informants in the country today.

Based on this phenomenon, during the ethnobotanical surveys, the source of the collected traditional knowledge has to be documented in order to separate the archaic and official data from each other. This aspect is a new point in ethnobiological inventories today, which may open new directions towards the discovery and analysis of several promising medicinal and phytotherapeutical data, bearing valuable ethnographic, botanical and pharmaceutical results in the future.

In conclusion, the reported data and the ongoing change in lifestyle of the people draw attention to the necessity for conservation and further analyses of the observed data. This is inarguably the most important and urgent task of researchers working in the field of ethnobiology in Transylvania today.

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References

Antalné TM (2003) Gyimes-völgyi népi gyógyászat (Ethnomedicine in the Ghimes). Európa Folklór Intézet—L'Harmattan, Budapest

Babai D, Molnár ZS (2009) Népi növényzetismeret Gyimesben II (Ethnogeobotanical studies in Ghimes. Part II). Bot Közl 96:145–173

Bakay P, Harangozó I (eds) (2007) Tankó Mónus Berta csángó pásztor emlékezései (Memoirs of the Csángó shepherd Berta Tankó Mónus). Ipolyi Arnold Népfőiskola, Újkígyós

Balázs D (2010) Popular healing in Siklód and some questions of the research. Kaleidoscope 1:88–94

Bartha SG (2013) Népi gyógynövényismeret Erdővidéken (Ethnobotanical data in Erdővidék) (MSc Thesis). University of Pécs, Pécs

Bartha S, Balogh L, Papp N (2011) Népi gyógynövényismereti adatok Nagybaconban és környékén (Ethnobotanical values in *Băţanii Mari* and in its vicinity). Gyógyszerészet (Suppl):23–24

Benkő J (1778) Transsilvania specialis (Latin manuscript) In Hungarian: (1999): Transsilvania specialis: Erdély földje és népe I–II. (World and people of Transylvania). Kriterion, Bucharest, Cluj Napoca

Benkő J (1781) Halotti Beszéd Toronyfalvi Toronya Borbára Cserei Miklósné felett (Funeral oration for Toronyfalvi Toronya Borbára Cserei Miklósné). Sibiu

Boris GY (2010) Népi gyógynövényismeret a székelyföldi Lövétén (Ethnobotanical data in Lueta) (BSc Thesis). University of Pécs, Pécs

Bosnyák S (1973) Adalékok a moldvai csángók népi orvoslásához (Ethnomedicinal data of the Csángós in Moldova). Orvostört Közl 69–70:279–298

Csedő K (ed) (1980) Hargita megye gyógy- és füszernövényei (Medicinal and aromatic plants of Harghita county). Tipografia, Targu Mures

Csergő B (1978) A vörösfenyő Küküllőkeményfalva népi növényismeretében (Scots in the botanical knowledge of the people of Târnoviţa). In: Kós K, Faragó J (eds) Népismereti dolgozatok. Kriterion, Bucharest, pp 40–50

Csoma G (2000) Varázslások és gyógyítások a moldvai csángómagyaroknál (Witchcraft and healings of the Csángós in Moldova). Kráter Mühely Egyesület, Pomáz

Csürös I, Csürös L (1996) A kolozsvári Malomvölgy flórájának növényföldrajzi és ökológiai jellemzése (Geographical and ecological characterization of the flora of Malom-valley). Múzeumi Füzetek 5:39–44

Csürös I, Csürös M, Pálfalvi P (1980) A Csíki-havasok néhány növénytársulásának ökológiai jellemzése (Ecological characters of the vegetation of Munţii Ciucului). Acta Hargit 27:417–432

Csüry B (1933) Növénynevek Bogdánfalváról (Plant names in Valea Seacă). Magy Nyelvőr 29:249–251 (316–321)

Diószegi V (1960) Embergyógyítás a moldvai székelyeknél (Human medicine of the Széklers in Moldova). Népr Közl 3–4:35–124

Erdei A (2011) Elődeink öröksége: békési és székelyföldi települések etnobotanikai értékelése (Ethnobotanical evaluation of Békés and Lueta) (BSc Thesis). University of Szeged, Szeged

Ernyei J (1932) Benkő József természettudományi hagyatéka (Natural legacy of József Bekő). Botanikai Közlemények 29(1–4):56–72

Fancsali I (2010) Reevaluarea acţiunii plantelor medicinale folosite în etnomedicina din bazinul superior al Trotuşului (Ghimeş) (Ethnomedicinal data of Ghimeş) (MSc Thesis). University of Medicine and Pharmacy of Targu Mures, Targu Mures

Frendl K (2001) Népi növényismeret, népi humán- és állatgyógyászati adatok gyüjtése Székelyföldön (Ethnobotanical data of human medicine and veterinary in Széklerland) (MsC Thesis). University of West Hungary, Mosonmagyaróvár

Frendl K, Balogh L (2004) Etnobotanikai és etnomedicinai adatok Gyimesközéplok térségéből (Ethnogeobotanical and ethnomedicinal data from Lunca de Sos). Bot Közl 91:147–148

Frendl K, Kripner V (2005) Kutatómunka csángó lakta településeken (Studies in the villages of the Csángós). Agrár Hírvilág 12(3):10–11

Frendl K, Balogh L (2006) Gyimesi és Úz-völgyi csángó települések népi növényismerete (Ethnobotanical knowledge of the Csángós in Ghimes and Uz). Kitaibelia 11(1):50
Frendl K, Papp N, Grynaeus T (2007) Veterinary based on experience and belief in Gyimes and Úz Valley of Csángó's (Transylvania, Romania). In: Abstracts of the 6th European Ethnopharmacological Congress, Leipzig, Germany, 8–10 November, p 46
Grynaeus T, Szabó LGy (2002) A bukovinai hadikfalvi székelyek növényei (Plants in the Széklers in Dorneşti in Bucovina). Gyógyszerészet 46:251–259 (327–336, 394–399, 588–600)
Gub J (1991) *Népi gyógyászat a Sóvidéken (Ethnomedicine in Sóvidék), vol 1*. Hazanéző könyvek, Firtos Müvelődési Egylet, Corund, pp 14–16
Gub J (1993) Adatok a Nagy-Homoród és a Nagy-Küküllő közötti terület népi növényismeretéhez (Ethnobotanical data of the Nagy-Homoród and Nagy-Küküllő). Néprajzi Látóhatár 1–2:95–110
Gub J (1994) Növényekkel kapcsolatos hiedelmek és babonák a Sóvidéken (Beliefs and superstitions related to plants in Sóvidék). Népr Látóhatár 3–4:193–198
Gub J (1996) Erdő-mező növényei a Sóvidéken (Plants in the fields and forests in Sóvidék). Hazanéző könyvek, Firtos Müvelődési Egylet, Corund
Gub J (1998) Borogatók, kenőcsök, sebtapaszok a Sóvidéken (Foments, ointments and plasters in Sóvidék), vol 6. Kriza János Néprajzi Társaság Évkönyve, Cluj-Napoca, pp 266–276
Gub J (2001) Kertek, mezők termesztett növényei a Sóvidéken (Cultivated plants in the fields and gardens in Sóvidék). Erdélyi Gondolat, Odorheiu Secuiesc
Gub J (2003) Természetismeret és néphagyomány a székely Sóvidéken (Traditions and knowledge about the nature in Sóvidék). Erdélyi Gondolat, Odorheiu Secuiesc
Györffy I (1937) Viricselés a Székelyföldön (Drainage of birch in Széklerland). Ethnographia 48(2–3):205–220
Halász P (2007) A moldvai csángó magyarok hagyományos állattartása (Traditional livestock keeping of the Csángós in Moldova). General Press, Budapest
Halász P (2010) Növények a moldvai magyarok hagyományában és mindennapjaiban (Plants in the tradition and everyday life of the Hungarians in Moldova). General Press, Budapest
Halászné ZK (1981) Adatok a moldvai magyarok gyógynövény-használatához (Ethnobotanical data of the Hungarians in Moldova). Gyógyszerészet 25:361–367
Halászné ZK (1987) Moldvai csángó növénynevek (Csángó plant names in Moldova). Magyar Csoportnyelvi Dolgozatok 36. University of Eötvös Loránd, Budapest
Halászné ZK (1993) Sebkezelés a moldvai és a gyimesi magyaroknál napjainkban és Gelencén a XVIII. században (Treatment of wounds in Ghimes nowadays and in Gelence in the 18th century). In: Halász P (ed) Studies dedicated to the memory of Pál Domokos. Lakatos Demeter Egyesület, Budapest, pp 109–116
Holló G, Rácz G (1968) Plante folosite in medicina populară din Bazinul superior al Trotusului (Ghimes) (Ethnomedicinal data in Ghimes). Plantele medicinale din flora spontană al Bazinului Ciuc. Cons. Pop. al Jud. Harghita, Miercurea Ciuc, pp 171–176
Hoppál M (1990) Népi gyógyítás. In: Dömötör T, Hoppál M (eds) Magyar Néprajz VII (Hungarian Ethnography VII). Akadémiai Kiadó, Budapest, pp 693–724
István L, Szőcs L (2008) Taplómegmunkálás Korondon (Preparation of tinders in Corund). Udvarhelyszék Kulturális Egyesület, Odorheiu Secuiesc
Kakas Z (1973) A "nagyerejü fü" a felső-háromszéki néphitben (*Atropa belladonna* L. in the beliefs in Trei Scaune). Folk Arch 1:91–97
Keszeg V (1981) A mezőségi Detrehemtelep népi gyógyászata (Ethnomedicine in Colonia in Câmpia Transilvaniei). Népism Dolg 97–117
Kisné PI (2006) A fenyő hasznosítása a Székelyföldön (Use of pines in Széklerland). Székelyföld Kult Folyóir 10(12):101–116
Kobzos KT (1999) Adalékok a moldvai csángók növényi gyapjúfestéséhez (Data to wool dyeing at the Csángós in Moldova). In: Pozsgai P (ed) Tüzcsiholó. Táton Bt, Budapest, pp 707–713
Kocsis M (2010) Népi gyógyászat Szitáson (Ethnomedicine in Nicoreşti). In: Czégényi D, Keszeg V (eds) A beteg ember. Mentor, Targu Mures, pp 15–108

Kóczián G (1990) A nadragulya (*Atropa belladonna* L.) babonás felhasználása Máramarosban (The magical use of *Atropa belladonna* L. in Maramureş). Honism 4:58–62
Kóczián G, Pintér I, Szabó LGy (1975) Adatok a gyimesi csángók népi gyógyászatához (Ethnobotanical data of the Csángós in Ghimes). Gyógyszerészet 19:226–230
Kóczián G, Pintér I, Gál M, Szabó I, Szabó L (1976) Etnobotanikai adatok Gyimesvölgyéből (Ethnobotanical data of the Ghimes-valley). Bot Közl 63(1):29–35
Kóczián G, Szabó I, Szabó L (1977) Etnobotanikai adatok Kalotaszegről (Ethnobotanical data from Ţara Călatei). Bot Közl 64(1):23–29
Kosz Zs (2010) Népi gyógyászat Csíkrákoson (Ethnomedicine in Racu). In: Czégényi D, Keszeg V (eds) A beteg ember (The ill people). Mentor, Targu Mures, pp 109–178
Kovács S (1976) Kalotaszegi népi gyógymódok (Ethnomedicinal treatments in Ţara Călatei). Folk Arch 5:93–113
Kovács JA (1997) A Székelyföld flórakutatásának áttekintése (Review of the flora surveys in Széklerland). Bot Közl 84(1–2):41–49
Kovács JA (2009) A cserefa és a székelység (The oak species and the Széklers). Művelődés 62:41–45
Lakatos I (2000) Embergyógyítás a lábnyiki csángóknál (Human medicine of the Csángós in Vladnic). Mold Magys 5:12–13
Mészáros Á (1998) Népi gyógyítás Székelyvarságon (Ethnomedicine in Varşag). In: Bárth J (ed) Havasalja havasa. Bács–Kiskun Megyei Múzeum, Kecskemét, pp 391–468
Mihalescu L, Vosgan Z, Rosca OM, Danci O (2010) The ornamental, aromatic and edible vegetal species from Lapus region (Transylvania). Abstracts of the 19th EVS Workshop, Pécs, 27th April–2nd May, p 66
Miklóssy VV (1978) Festőnövények a csíki háziiparban (Dyeing plants in home industry in Ciuc). Népism Dolg 91–100
Miklóssy VV (1980) Csíki népi sebtapaszok (Traditional plasters in Ciuc). Népism Dolg 60–63
Molnár Zs, Babai D (2009) Népi növényzetismeret Gyimesben I (Ethnogeobotanical studies in Ghimes. Part I). Bot Közl 96(1–2):117–143
Molnár Zs, Babai D (2010) Sajátosságok a gyimesi népi növény- és növényzetismeretben (Peculiarities in the ethnobotany in Ghimes). *Korunk* 3(21):1
Pálfalvi P (1995) A Gyimesi-hágó (1164 m) környékének florisztikai vázlata (Floristic map of the vicinity of Ghimes). Múzeumi Füzetek 4:107–114
Pálfalvi P (1999) Növények a csíkszentdomokosi ember- és állatgyógyászatban (Plants in the human medicine and veterinary in Sândominic). In: Boér H (ed) Acta—1998 II. Székely Nemzeti Múzeum—Csíki Székely Múzeum, Sfântu Gheorghe—Miercurea Ciuc, pp 265–284
Pálfalvi P (2001) A Gyimesek botanikai és etnobotanikai kutatásának története (The history of the botanical and ethnobotanical studies of Ghimes). Kanitzia 9:165–180
Pápai PF (1690) Pax Corporis. M. Tótfalusi Kis Miklós nyomt., Cluj-Napoca
Papp N (2011) Népi gyógynövény-ismereti kutatások a kolostori gyógyászatban és Erdélyben (2007–2010) (Ethnobotanical studies in the monasteries and in Transylvania). Kaleidoscope 2(2):76–88
Papp N, Horváth D (2013) Vadon termő ehető növények Homoródkarácsonyfalván (Erdély) (Wild edible plants in Crăciunel (Transylvania)). In: Dénes A (ed) Ehető vadnövények a Kárpát-medencében (Wild edible plants in the Carpathians). Janus Pannonius Múzeum, Pécs, pp 83–92
Papp N, Birkás-Frendl K, Boris Gy, Vojkovics É, Bencsik T, Grynaeus T (2009a) Gyógynövények a népi bőrgyógyászatban (Herbs in the folk dermatology). Abstracts of the 14th Congressus Pharmaceuticus Hungaricus, Budapest, 13–15th November, p 110
Papp N, Frendl K, Boris Gy, Fancsali I, Csedő K, Grynaeus T (2009b) Comparative ethnobotanical study of medicinal plant uses from Transylvania. In: Abstracts of the Séminaire International sur Les Plantes, Aromatiques et Médicinales (SIPAM), Djerba, Tunesia, pp 188–189
Papp N, Birkás-Frendl K, Grynaeus T (2011a) Ethnobotanical values from some gardens in Csinód (Transylvania). Curare 34(1–2):97–102
Papp N, Bartha S, Boris Gy, Balogh L (2011b) Traditional use of medicinal plants for respiratory diseases in Transylvania. Nat Prod Commun 6(150):1459–1460

Papp N, Birkás-Frendl K, Farkas Á, Pieroni A (2013) An ethnobotanical study on home gardens in a Transylvanian Hungarian Csángó village (Romania). Genet Res Crop Evol 60:1423–1432
Péntek J (1980) Kerti virágok és dísznövények Kalotaszegen (Ornamental plants in Ţara Călatei). Népism Dolg 104–114
Péntek J (1982) Kalotaszegi népi növényismeret. Az antropomorfizáció nyelvi vonatkozásai (Ethnobotanical knowledge in Ţara Călatei. Linguistic aspects of anthropomorphism). *Müvelődés* 35(2):40–42
Péntek J (1984) Tökfélék a kalotaszegi népnyelvben és népi kultúrában (Pumpkin species in the folk linguistics and culture in Ţara Călatei). *Müvelődés* 37(2):34–38
Péntek J (1997) A növénynevek és a földrajzi nevek viszonyáról (Relation between the geographical names and plant terminology). In: Gergely P, Hajdú M (eds) Az V. Magyar Névtudományi Konferencia előadásai (Presentations of the 5th Congress of Onomatology), vol 209. *Magyar Nyelvtudományi Társaság*, Budapest—Miskolc, pp 427–430
Péntek J (2003) *Népi nevek, népi hagyományok (Folk terminology, traditions)*. Mentor, Targu Mures
Péntek J, Szabó TA (1976a) Tájékoztató mutatvány egy népi növényismereti gyüjtésből (Handout of an ethnobotanical study). *Nyelv Irodalomtud Közl* 20(1):52–60
Péntek J, Szabó TA (1976b) Egy háromszéki falu népi növényismerete (Ethnobotanical studies in a village in Trei Scaune). Ethnographia 87(1–2):203–225
Péntek J, Szabó TA (1980) A régi növényvilág és változásai a kalotaszegi földrajzi nevek tükrében (The old vegetation and its change as reflected by the geographical names in Ţara Călatei). In: Teiszler P (ed) *Nyelvészeti tanulmányok (Linguistic studies)*. Kriterion, Bucharest, pp 131–172
Péntek J, Szabó TA (1985) Ember és növényvilág. Kalotaszeg növényzete és népi növényismerete (People and plants: vegetation and rural botanical knowledge in Ţara Călatei). Kriterion, Bucharest
Pintér I, Szabó I, Kóczián G, Gál M, Szabó L (1974) Kultúrnövény-tájfajták, vad növényfajok és etnobotanikai adatok gyüjtése a Kászoni-medencében (Ethnobotanical data of cultivated and wild plants in Depresiunea Plăieşi). Agrobot 16:123–137
Pócs É (1990) Néphit. In: Dömötör T, Hoppál M (eds) Magyar Néprajz VII (Hungarian Ethnography VII). Akadémiai Kiadó, Budapest, pp 527–692
Rab J (1982) Újabb népgyógyászati adatok Gyimesből (New ethnomedicinal data in Ghimes). Gyógyszerészet 26:325–333
Rab J (1993) Az etnogeobotanika—mint történeti ökológiai segédtudomány (The ethnogeobotany as auxiliary science). In: Várkonyi Á, Kósa L (ed) Európa híres kertje (Famous garden of Europe). Orpheusz, Budapest, pp 223–257
Rab J (2000) Népi növényismeret a Gyergyói-medencében (Ethnobotany in Gheorgheni). Pallas-Akadémia, Miercurea Ciuc
Rab J, Tankó P, Tankó M (1980) Növényismeretünk gazdag és pontos (Gyergyó és Gyimes) (Ethnobotany in Gheorgheni and Ghimes). *Falvak Dolgozó Népe* 36(13):4
Rab J, Tankó P, Tankó M (1981) Népi növényismeret Gyimesbükkön (Ethnobotany in Ghimeş-Făget). Népism Dolg 23–38
Rácz J (2000) Húr szavunk a növénynevekben (The word chord in plant names). Magyar Nyelvőr 124(2):239–247
Rácz G, Füzi J (eds) (1973) Kovászna megye gyógynövényei (Medicinal plants in Covasna). Árkosi Agronómusok Háza, Sfântu Gheorghe
Rácz G, Rácz E (1972) Erdővidék flórája Benkő József (1740–1814) kéziratiban (Flora of Covasna in manuscripts of József Benkő). Aluta 61–69. Ceres Könyvkiadó, Bucharest
Sebestyén Á (2008) Gyógyító praktikák. Néprajzi gyüjtés a bukovinai székelyeknél (Healing practices. Ethnographical study among the Széklers in Bucovina). Sebestyén Ádám Székely Társulat, Kakasd
Sipos Á (2010) Népi gyógymódok és babonák Magyarlapádon (Home remedies and beliefs in Lopadea Noua). Termész Világa 141(12):154–157
Szabó TA (1976) A természettudományok és a néprajz határán (On the border of natural sciences and ethnography). Népism Dolg 36–40

Szabó TA (ed) (1978) Melius Peter: Herbarium. Kriterion, Bucharest
Szabó TA, Péntek J (1976) Ezerjófü. Etnobotanikai útmutató (Centaury. Ethnobotanical guide). Kriterion, Bucharest
Szabó L (1990) Népi természetismeret. In: Dömötör T, Hoppál M (eds) Magyar Néprajz VII (Hungarian Ethnography VII). Akadémiai Kiadó, Budapest, pp 725–742
Szabó LGy (2002) Népi gyógynövény-ismeret Kalotaszegen és Gyimesvölgyében (Ethnobotanical data in Ţara Călatei and Ghimes). Turán 32(5/4):39–52
Tankó M, Ilyés Á (1978) Növények, helynevek (Gyimesbükk, Tekerőpatak) (Plants, toponyms (Ghimeş-Făget, Valea Strâmbă)). *Falvak Dolg Népe* 14(13):5
Tarisznyás M (1978) A gyüjtögető gazdálkodás hagyományai Gyergyóban (Traditions of the gatherer agriculture in Gheorgheni). Népism Dolg 25–33
Vajkai A (1943) Népi orvoslás a Borsavölgyében (Ethnomedicine in Borsa-valley). Erdélyi Tudományos Intézet, Cluj-Napoca
Vajkai A (2003) Népi gyógyászat (Ethnomedicine). Jószöveg Mühely, Budapest
Varjas B (1943) XVI. századi magyar orvosi könyv (Hungarian medical book from the 16th century). Gróf Teleki Pál Tudományos Intézet, Sárkány Nyomda RT., Cluj-Napoca
Vasas S (1985) Népi gyógyászat, kalotaszegi gyüjtés (Ethnomedicinal study in Ţara Călatei). Kriterion, Bucharest
Vita Zs (1994) Tápláléknövények gyüjtése Nagyenyed környékén (Gathering of food plants in the vicinity of Aiud). Népism Dolg 44–47
Vörös É (2008) A magyar gyógynövények neveinek történeti-etimológiai szótára (Historical-etymological vocabulary of Hungarian plant names). University of Debrecen, Debrecen
Zakariás E (1995) Nemi szerepek a növénytermesztésben Erdővidéken (Gender's role in agriculture). In: Zakariás E (ed) Kriza János Néprajzi Társaság Évkönyve 3. Növény és kultúra (The 3rd annuary of the Society János Kriza. Plant and culture). Society János Kriza, Cluj-Napoca, pp 27–33
Zillmann J (1997) Népi gyógyászat Havadon (Ethnomedicine in Neaua). Népr Látóhatár 1–2:124–148
Zsigmond Gy (ed) (2005) *Növények a folklórban. Plante în folclor (Plants in the folklore)*. Magyar Köztársaság Bukaresti Kulturális Központja, Bucharest

Chapter 4
Bulgarian Medical Ethnobotany: The Power of Plants in Pragmatic and Poetic Frames

Anely Nedelcheva and Stefan Draganov

4.1 Introduction

Medical folk botany is a unique manifestation of folk knowledge, the basis of which is the natural human instinct for survival. This traditional knowledge is maintained and developed in support of the ancient right of every person for just existence without pain and suffering. These processes arise and develop within the spatio-cultural and historical scope of society. Medical ethnobotany is a dynamic system, developing in different directions and at a different pace, but always revolving around man's knowledge of their own body and the surrounding nature.

Plants are the closest and most natural environment for the existence of man and an essential part of his/her way of life. They are a main element of the beliefs, methods and institutions for diagnosis and treatment of diseases and their prevention. Because of this, folk botanical knowledge has an important role in every ethnomedicine. Bulgarian medical ethnobotany is a result of the development of archaic thinking and people's consciousness. It precedes contemporary medicine and continues to exist alongside it as a separate area in traditional knowledge and culture. This peculiar symbiosis is part of the image of Bulgarian people and a natural source of self-knowledge and perfection in the pursuit of healthy and respecting nature lifestyle. It is also at the basis of contemporary Bulgarian complementary and alternative medicine.

It is a duty, honour and pleasure for this generation to work toward revealing the uniqueness of this phenomenon through scientific methods and techniques based on critical analysis of the famous old manuscripts, documentary sources and artifacts together with fieldwork (collecting information from the population) in regions with preserved traditions in using plants as a curative method.

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4.1.1 "Land of the Bulgarians"

The Balkan Peninsula is part of southeastern Europe, a historical crossroads of the ancient cultures of Europe and Asia and a territory on which a multitude of ethnic and religious communities live. Because of its geographical location, Bulgaria is a country where the culture and history of the people populating the Balkan Peninsula have been interwoven. The population of Bulgaria consists mainly of ethnic Bulgarians (84.8%), with two sizable minorities, Turkish ethnic group (8.8%) and Roma (4.9%). The official language of the country is Bulgarian, which is a member of the Slavic linguistic group (Anonymous 2011).

The territory of Bulgaria belongs mainly to the southeastern province of the Central European floristic region. Bulgarian flora comprises 159 families, 906 genera and 4030 species, 12.8% are endemics of the native Bulgarian flora and 11% of the total flora (4102 species), including alien species (Petrova and Vladimirov 2010; Assyov et al. 2012). Over 750 species have healing properties, 300 of the latter are medicinal plants gathered yearly and 200 are actively used (Ahtarov et al. 1939; Stojanov and Kitanov 1960; Stranski 1963; Georgiev 1999; Anonymous 2000; Ivancheva and Stancheva 2000; Evstatieva et al. 2007). Bulgaria has four clearly manifested seasons with a traditional seasonal diet. The use of fresh herbs is also seasonal, which causes the need for developing the ways for their storage and year-round use.

4.1.1.1 The "Herbal" Story

The place of medicinal plants in the consciousness of the Bulgarians and Bulgarian medical ethnobotany cannot be understood without the ancient legend for man and his creation.

> Once even before man was created herbs were common grasses, beautiful and fragrant but they did not have curative powers because in His design man should not fall victim to diseases but be healthy and strong. God made man from mud and left him to dry when the devil came. With a few strokes of the cudgel he stabbed the fragile figure several times and ran away. The next morning God rushed to save his creature. He looked around, picked some grasses and filled with them the deep holes on the hurt human body. The wounds were instantaneously cured but soft spots remained forever for man, prone to diseases and misfortunes. They could all be cured immediately as long as the same grass could be found which God had once put on that place. (Ginchev 1988; Stavreva 2007)

This beautiful story lies at the philosophical and pragmatic foundation of the interest in getting to know plants and their properties and benefits for man and opens a large scope for the naturalist: "The beautiful grasses, healing herbs already, are all around us. But as we do not know them, we do not know how they could serve us." The legend has its continuation, too. It explains the folk opinion of the need for passing on (sharing), storage and application of what has been learned: "… but then when people were born and died, they forgot a lot of the herbs, for what kind of remedy each one was determined by God and now they are looking for them. For

this reason everyone who recognizes a herb it is a sin not to share it with the others. If they hide it, they help the devil who has damaged the human body and wants to damage it now as well" (Ginchev 1988; Stavreva 2007). In this poetic manner, the theoretical foundations are laid of the practical natural science and its application in aid of the Bulgarian's difficult life.

The roots of Bulgarian medical ethnobotany can be traced in the distant pre-Christian culture which is a legacy of the main ethnic groups forming the Bulgarian nation: Thracian, Slavic and Proto-Bulgarian. Though scarce, there is information about their medical culture. There is true old-Bulgarian culture and medicine after Christianization (ninth century), as after all the dominant Christianity backs down on the pagan antique tradition and puts it in its service. Thus, the foundation of Bulgarian ethnomedicine and medical ethnobotany in Bulgaria in particular are rooted in antique education, Christian philosophy and primitive mythology (Georgiev 2011).

Knowledge of plants, their diversity and curative properties is reflected in numerous folk recipes, methods for treatment and prevention of a large number of diseases. At first sight, the application of plants is a chaotic spread of knowledge and empirical experience often manifested in oral form such as magic, fortune-telling, beliefs and others. This seemingly shapeless flow of information has been structured and organized through time and space in the form of traditional rights and rituals, many of which have to a different extent preserved their importance even to this day (Georgiev 1999).

There are words in Bulgarian which are specifically related to medicinal plants and the activities connected with them. All representatives of the plant kingdom that are used for the treatment of diseases or prevention from them are called "билки" (bilki; herbs), which originates from the old-Bulgarian word "биле" (bile; herb). Herbs are not equal to the other grasses and trees, they are particularly respected. A man who knows and uses the properties of herbs for different purposes is called "билер" (biler) or "билкар" (bilkar; herbalist). These people obtained medicinal plants by picking them in the vicinities of the place where they lived, whereas a small part of them were delivered from abroad. These words are actively used in contemporary Bulgarian language, too.

Christian doctrine officially denounces and stigmatizes traditional healers. In Christian literature and painting, the sorceress, the fortune-teller and the woman herbalist are equalled to the enchantress as servants to the devil. Meanwhile, the oldest written data of the Bulgarian language for knowing and using herbs from the early Middle Ages are in books for healing whose authors and also herbal treatment practitioners are monks.

4.1.1.2 "Tea" Versus "Herbal Tea"

With the distribution of tea as a hot drink in Europe, it quickly grew in popularity; moreover, it built a culture of tea-drinking in a lot of countries, including the Balkans, which continues today. In the old-Bulgarian recipes, due to the lack of

developed folk medicinal nomenclature for the infusion or potion that is prepared, the descriptive approach is used, or they are often called "чорба" (chorba) by analogy with the hot soups prepared. The word "tea" mostly corresponded to this method of preparation. The tea (*Camellia sinensis* (L.) Kuntze) plant was also hardly accessible or an expensive product. Gradually, the name "tea" established itself for the already existing and traditional way of use of a large part of the herbs. In spoken language until these days, "tea" is understood as fruit and herbal teas are mainly perceived as a medicine. These herbs, which are boiled and drunk as tea, are highly regarded. Apart from the Chinese tea (*C. sinensis*), ten more types of "teas" are known in Bulgarian folk medicine according to their places of growth and spread: garden tea (*Salvia officinalis* L.), forest tea (*Origanum vulgare* L.), Balkan tea (*Rhododendron myrtifolium* Schott and Kotschy, endemic), Macedonian tea (*Stachys palustris* L.) and, very popular today, Pirin Mountain tea (*Sideritis scardica* Griseb.) (Ahtarov et al. 1939).

4.2 Historical Sources

The first documentary sources for treatment with herbs are older than the memories for them. From the answers of Pope Nicholas I (ninth century) to the questions of the Bulgarian King Boris I, we know that the Bulgarians used "red stone" (Argilla rubra) as a curative method and carried mascots for prevention from diseases (Petkova 2007).

Joan Ekzarh in "Hexameron" (tenth century) laid the foundation of scientific terminology in nature studies, botany, biology, astronomy and anthropology. Over 30 plants are mentioned in the text, for which information is given on their morphology and development, and for some of the species, their curative powers are specified: anaesthetizing and painkilling effect of mandrake plant, the psychotropic effect of hemlock, curing long-lasting diseases with hellebore. The use of poisonous plants as curative is also stressed in this manuscript: "The hellebore, for which it is known that can cause acute unhealthy disability, is capable of destroying the cause for each illness if it is mixed with other plants".

The first attested written curative tips and books of recipes precede the first written records of oral folklore (Petkova 2007). The earliest known Slavic document with Slavic recipes dating from eleventh to twelfth century is gnoseological found in a manuscript of the collection of the Sinaia Monastery "St. Ekaterina" and is of great importance for historical lexicology as well as for the history of medicine on Bulgarian lands in the Middle Ages (Tarnanidis 1988; Velcheva 1988, 1991).

4.2.1 The Bogomil Movement

The Bogomil movement was a heretic socioreligious teaching that appeared in Bulgaria in the first half of the tenth century and spread in the tenth to twelfth centuries

in Serbia, Bosnia, the whole Byzantine Empire, Italy, Southern France and other countries in central and western Europe (Gecheva 2007). They accompanied their preaching with helping the suffering and the ill, most of all those with disrupted spirituality, people in their deathbeds, with eye diseases and so on. Sources testify masterful knowledge and application of suggestion, fortune-telling and charming by the Bogomils. Meanwhile, we cannot imagine the natural and folk medicine stands of the Bogomils without vegetarianism and without their attitude to nutritional and curative methods of plant origin. The Bogomils combined psychotherapy with the use of herbs. The use of curative methods of plant origin was too popular not only because of the directed to nature and simple outlook on life of the Bogomils but also because of the Thracian, Slav and Proto-Bulgarian traditions in this respect (Apostolov et al. 1982). There are records of herbal treatment among the Bogomils, but an ethnobotanical study of these artifacts is still lacking.

4.2.2 Old Manuscripts

Complete books of recipes were archived as late as the seventeenth century. Later copies of books for healing are dated towards the end of the eighteenth and during the nineteenth and even the first years of the twentieth century, from the town of Koprivshtitsa, Kalofer and others. The manuscripts are compilative in their nature and are part of the total world outlook (Miltenova and Kirilova 1994; Petkova 2007, 2008; Georgiev 2011). The ethnobotanical study of a manuscript of this period (Nedelcheva 2012a) demonstrates how old written sources can be used to collect information for new medicinal plants and traditional folk remedies, historical information about the level of trade contacts and some sociocultural processes in the society. The obtained data can be analyzed by taking into account the historical facts regarding the period of the application of the treatment and the time of creation and printing of the text. Reading such a source is slow and requires multilayered knowledge of botany, history, and linguistics.

The ethnobotanical study of *Canon Prayer to St. Ivan Rilski and Medicinal Text* (1845), a part of the Bulgarian early printed literature heritage, has shed new light on plants in the life and healing activities of the saint. Sixty-seven determined species from 36 families are included in the 92 recipes covering a wide range of illnesses and symptoms ranging from antiseptic to cures for neurological diseases. The established significant participation of spices such as clove, cinnamon, mastic and ginger in folk remedies sheds new light on the list of species that are traditionally used in folk medicine. The importance of these species, together with the presence of many organic and inorganic compounds, showed their greater significance than was previously suspected. The traditional use of medicinal plants is more precise and more oriented to the "East plants" than it was traditionally believed in Bulgarian society. Last but not least, the ethnobotanical study on this book and the presented results support the thesis that it was founded on authentic recipes from the healing activity of St. Ivan Rilski, which has increased its historical value a lot. Some plants and their use reveal a link between the manuscript and the knowledge of St. Ivan Rilski

from hagiography: *Cicer arietinum* L., *Rheum palmatum* L., *Rheum raponticum* L. and *Rosa canina* L. (Nedelcheva 2009, 2012a).

4.3 Plant Diversity of Herbs

The main components in folk remedies are medicinal plants, followed by the animals and animal products such as honey, eggs, leeches, blood, musk, etc., mineral elements (S, Hg, Au, Fe) and other organic and inorganic compounds. Most of them are plants from Bulgarian flora, including imported and naturalized species (Table 4.1).

4.3.1 Vascular Plants from Bulgarian Flora Used in Medical Ethnobotany

This large and basic group contains widely dispersed plants used and appreciated for their curative powers (see Table 4.1, 1). These are species that are usually kept in every household; they are used as first aid for the most common general complaints (see Table 4.1, 1.1). They are frequently mentioned by local people in semi-structured interviews during ethnobotanical field studies (more than 70%). They are easily stored in dry conditions most of all and are used for the preparation of herbal tea, infusions or potions, some of which externally. Respiratory, digestive and skin diseases are among the most frequently treated with home healing methods.

There is another group of plants with a lower quotient of mention by local people but that is also widely used (see Table 4.1, 1.2). They usually refer to more concrete and specific complaints; they are stored and prepared in a more difficult way, have unpleasant taste, more specific places of growth or are connected with regional use, related to their spread and others. This group includes many species, mostly from the Lamiaceae, Compositae and Rosaceae families.

Some wild-growing plants used for food (edible greens) are widely used because of their curative properties, too (Table 4.1, 1.3). Undoubtedly, nettle (*Urtica dioica*) is the most popular here. It is a plant symbolic of the beginning of spring, the season of fresh foods and herbs. The curative effect of all its parts—root, leaves, aerial part, fruit (seeds)—is well known.

Another large group is a species with a wide distribution area, but not quite as abundant and less used (see Table 4.1, 2). These plants have specialized use. Most of them are not widely known for different reasons. They are picked, prepared and used under the control of people with wider expertise on herbs: healers, local "experts" with wide expertise on herbs. Poisonous plants mostly belong to this group (*Atropa bella-donna*, *Helleborus niger, Helleborus odorus, Hedera helix, Tanacetum vulgare*; see Table 4.1, 2.5); difficult-to-recognize plants (*Rhamnus catharctica, Buglossoides purpureocaerulea*; see Table 4.1, 2.3); plants with usable

Table 4.1 Plants (vascular plants) from Bulgarian flora used in Bulgarian medical ethnobotany, including imported and naturalized species (Family assignments for all plants discussed in this chapter follow Angiosperm, Phylogeny Group III guidelines)

Category	Most relevant species
1. Common wild species with wide distribution area, most widely used	1.1 *Achillea millefolium* L. (Compositae), *Cotinus coggygria* Scop. (Anacardiaceae), *Crataegus monogyna* Jacq. (Rosaceae), *Hypericum perforatum* L. (Hypericaeae), *Matricaria chamomilla* L. (Compositae), *Melissa officinalis* L. (Lamiaceae), *Mentha* spp. (Lamiaceae), *Mentha spicata* L. (Lamiaceae), *Origanum vulgare* L. (Lamiaceae), *Rosa canina* L. (Rosaceae), *Sambucus nigra* L. (Adoxaceae), *Tilia* spp. (Malvaceae), *Thymus* spp. (Lamiaceae) 1.2 *Achillea clypeolata* Sm. (Compositae), *Alchemilla* spp. (Rosaceae), *Artemisia* spp. (Compositae), *Centaurium erythraea* Rafn (Gentianaceae), *Cornus mas* L. (Cornaceae), *Corylus avellana* L. (Betulaceae), *Herniaria glabra* L. (Caryophyllaceae), *Herniaria hirsuta* L. (Caryophyllaceae), *Humulus lupulus* L. (Cannabaceae), *Paliurus spina-christi* Mill. (Rhamnaceae), *Pinus sylvestris* L. (Pinaceae), *Plantago lanceolata* L. (Plantaginaceae), *Plantago major* L. (Plantaginaceae), *Quercus* spp. (Fagaceae), *Salvia officinalis* L. (Lamiaceae), *Sambucus ebulus* L. (Adoxaceae), *Satureja* spp. (Lamiaceae), *Teucrium chamaedrys* L. (Lamiaceae), *Tussilago farfara* L. (Compositae), *Vitis vinifera* L. (Vitaceae) 1.3 *Rumex* spp. (Polygonaceae), *Urtica dioica* L. (Urticaceae)
2. Species with a wide distribution area, but not abundant, less used	2.1 *Althaea officinalis* L. (Malvaceae), *Arctostaphylos uva-ursi* (L.) Spreng. (Ericaceae), *Carlina acanthifolia* All. (Compositae), *Equisetum arvense* L. (Equisetaceae), *Gentiana* spp. (Gentianaceae), *Glycyrrhiza glabra* L. (Leguminosae), *Inula* spp. (Compositae), *Malva sylvestris* L. (Malvaceae), *Melilotus officinalis* (L.) Pall. (Leguminosae), *Ononis arvensis* L. (Leguminosae), *Paeonia peregrina* Mill. (Paeoniaceae), *Papaver rhoeas* L. (Papaveraceae), *Primula officinalis* (L.) Hill (Primulaceae), *Potentilla* spp. (Rosaceae), *Rhamnus catharctica* L. (Rhamnaceae), *Ruta graveolens* L. (Rutaceae) 2.2 *Alchemilla* spp. (Rosaceae), *Alkanna tinctoria* Tausch. (Boraginaceae), *Angelica archangelica* L. (Apiaceae), *Astragalus glycyphyllos* L. (Leguminosae), *Berberis vulgaris* L. (Berberidaceae), *Buglossoides purpureocaerulea* (L.) I.M.Johnst. (Boraginaceae), *Drosera rotundifolia* L. (Droseraceae), *Salix* spp. (Salicaceae), *Stachys officinalis* (L.) Trevis. (Lamiaceae), *Symphytum officinale* L. (Boraginaceae), *Valeriana officinalis* L. (Caprifoliaceae) 2.3 *Cuscuta europaea* L. (Convolvulaceae), *Viscum album* L. (Santalaceae) 2.4 *Atropa belladonna* L. (Solanaceae), *Chelidonium majus* L. (Papaveraceae), *Colchicum autumnale* L. (Colchicaceae), *Conium maculatum* L. (Apiaceae), *Crocus* spp. (Iridaceae), *Dryopteris filix-mas* (L.) Schott., *Hedera helix* L. (Araliaceae), *Helleborus odorus* Waldst. & Kit. Ex Willd. (Ranunculaceae), *Hyoscyamus niger* L. (Solanaceae), *Tanacetum vulgare* L. (Compositae) 2.5 *Phyllitis scolopendrium* (L.) Newman (Aspleniaceae), *Polypodium vulgare* L. (Polypodiaceae)

Table 4.1 (continued)

Category	Most relevant species
3. Endemic plants	3.1 Endemics with a wide distribution area: *Achillea clypeolata* Sm. (Compositae), *Alchemilla* spp. (Rosaceae) 3.2 Restricted Balkan endemics: *Aesculus hippocastanum* L. (Sapindaceae), *Sideritis scardica* Griseb. (Lamiaceae) 3.3 Restricted Bulgarian endemics: *Rheum rhaponticum* L. (Polygonaceae)
4. Ornamental plants	*Aesculus hippocastanum* L. (Sapindaceae), *Calendula officinalis* L. *(Compositae), Papaver somniferum L. (Papaveraceae), Pelargonium spp. (Geraniaceae), Rosa x damascena (pro sp.) (Rosaceae)*
5. Ruderals	*Capsella bursa-pastoris* (L.) Medik. (Brassicaceae), *Urtica dioica* L. (Urticaceae)
6. Weeds	*Agrostemma githago* L. (Caryophyllaceae), *Cirsium vulgare* (Savi) Ten. (Compositae), *Consolida regalis* Gray (Ranunculaceae), *Cynodon dactylon* (L.) Pers. (Poaceae), *Elymus repens* (L.) Gould (Poaceae)
7. Cultivated species that is very popular	7.1 *Allium cepa* L. (Amaryllidaceae), *Allium sativum* L. (Amaryllidaceae), *Brassica nigra* (L.) K.Koch (Brassicaceae), *Brassica oleracea* L. (Brassicaceae), *Cucucrbita pepo* L. (Cucurbitaceae), *Cydonia oblonga* Mill. (Rosaceae), *Hordeum vulgare* L. (Poaceae), *Juglans regia* L. (Juglandaceae), *Phaseolus vulgaris* L. (Leguminosae), *Sinapis alba* L. (Brassicaceae), *Zea mays* L. (Poaceae) 7.2 *Anethum graveolens* L. (Apiaceae), *Apium graveolens* L. (Apiaceae), *Mentha spicata* L. (Lamiaceae), *Satureja hortensis* L. (Lamiaceae)
8. Asian medicinal plants (AMPs)	8.1 *Camellia sinensis* (L.) Kuntze (Theaceae), *Cinnamomum camphora* (L.) J. Presl (Lauraceae), *Cinnamomum verum* J. Presl (Lauraceae), *Curcuma zedoaria* (Christm.) Roscoe (Zingiberaceae), *Foeniculum vulgare* Mill. (Apiaceae), *Myristica fragrans* Houtt. (Myristicaceae), *Pimpinella anisum* L. (Apiaceae), *Piper nigrum* L. (Piperaceae), *Rheum palmatum* L. (Polygonaceae), *Syzygium aromaticum* (L.) Merr. & L. M. Perry (Myrtaceae), *Zingiber officinale* Roscoe (Zingiberaceae) 8.2 *Ginkgo biloba* L. (Ginkgoaceae), *Hibiscus* spp. (Malvaceae), *Panax ginseng* C. A. Mey (Araliaceae), *Sedum roseum* (L.) Scop. (*Rhodiola rosea* L.) (Crassulaceae) 8.3 *Eleutherococcus senticosus* (Rupr. & Maxim.) Maxim. (Araliaceae), *Euphorbia fischeriana* Steud. (*Euphorbia pallasii* Turcz.) (Euphorbiaceae), *Garcinia gummi-gutta* (L.) Roxb. (*Garcinia cambogia* (Gaertn.) Desr.) (Clusiaceae), *Scutellaria baicalensis* Georgi (Lamiaceae)
9. Ritual and symbolic plants	*Allium sativum* L. (Amaryllidaceae), *Atropa belladonna* L. (Solanaceae), *Galium* spp. (*Galium verum* L., *Galium album* Mill.) (Rubiaceae), *Geranium* spp. (Geraniaceae), *Ocimum basilicum* L. (Lamiaceae)

underground parts (*Glycyrrhiza glabra, Alkanna tinctoria*); rare plants (*Drosera rotundifolia*) and plants of hardly accessible places (*Viscum album*); high-mountain species (*Gentiana* spp.); plants with special requirements for their preparation and application (*Ruta graveolens*); parasite plants (see Table 4.1, 2.4) and others.

On the basis of empirical experience, people are well aware of the danger of using some plants, recognized as poisonous plants (see Table 4.1, 2.5). In the recipes when such species are included, attention is always emphasized and a careful description of the quantity used follows, an accompanying diet, etc. Large portions of this group are alkaloid-providing species, among which the widely used and mythologized belladonna (*Atropa belladonna*) is included. Thus, the barks from buckthorn (*Rhamnus catharctica*) are used after they have stayed for 1 year (fringe barks are poisonous and cause vomiting).

Very few use fern species (see Table 4.1, 2.6), but it is well known that the effect of sweet fern is amplified when mallow or colt's foot is used. This serves as a good example of folk knowledge concerning interaction between the species. Because of their specific development and appearance, parasite plants (see Table 4.1, 2.4) are more often subjects of rituals and beliefs and are rarely used with a curative purpose (e.g., *Viscum album*).

4.3.2 Mosses, Lichens and Mushrooms

No data are known for the use of mosses (if there has been any, probably *Sphagnum*). In people's minds, mushrooms refer to the wild, hunger, poverty, death and the other world. The mushroom is one of the attributes of wood nymphs. A few species of mushrooms are used in folk-curing practices. Stinkhorn (*Phallus impudicus* L.), bovista (*Lycoperdon bovista* L.): a wound from a cut is sprinkled with dust of ripe bovista; ergot (*Claviceps purpurea* Tulsne) and sclerotia are used for womb bleedings; the real tinder mushroom (*Fomes fomentarius* (L.) Fr.) for wounds and bleedings and Iceland moss (*Cetraria islandica* (L.) Ach.) for cough.

4.3.3 Balkan and Bulgarian Endemics

Some of the plants used in folk medicine are with restricted general distribution: Balkan and Bulgarian endemics (see Table 4.1, 3). The communities of horse chestnut (*Aesculus hippocastanum*) are of a relict origin and endemic spread on the Balkan Peninsula. In Bulgaria, there is only one place they are found: in eastern Stara Planina Mountain. Because of this, the data for its use in ethnomedicine are scarce. On the other hand, its wide use for planting in the urban environment and the popularity of medicines on the basis of plant extracts is the reason why it is more and more recognized by people as a curative plant (the seeds; see Table 4.1, 4). In the middle of the last century (during the period of socialism), the mass picking of seeds

of horse chestnut was widely spread and their delivery to herb-preparing centres was an educational out-of-school activity. Rosehip, chamomile and lime tree were also the subject of such massive pickings.

4.3.3.1 Pirin Mountain Tea

A plant with limited spread and wide use—hence high trade interest—is *Sideritis scardica*. Pirin Mountain tea is a Balkan endemic with a few natural populations in the country (see Table 4.1, 3.2). In recent years, there has been an increasing interest in endemic species and their use and popularization as curatives. Data concerning the use of the plant in the past are few, regional and partial. A number of scientific studies on the biology and phytochemical composition, as well as optimal cultivation of the species, are part of its popularization as a precious herb for sale. Solid pressure on natural populations has been registered, and as a result, a special scheme for preservation and use according to the law has been developed (Anonymous 2013).

4.3.3.2 Rila Rhubarb

The story of the Rila rhubarb is interesting: *Rheum rhaponticum* is a relict plant and Bulgarian endemic (Petrova 2006), distributed in southwestern Bulgaria (Rila Mountains) and included as Critically Endangered in the Red List of Bulgarian vascular plants (Petrova and Vladimirov 2009) (see Table 4.1, 3.3). Data about the use of *Rheum rhaponticum* as an edible plant are found in old monastery books and written sources of medical recipes. Information concerning this species is also presented in the oldest written documents about Bulgarian traditional culture of feeding (Nedelcheva 2012a, 2013). In folk medicine, the infusion of the roots is a laxative, but when taken in small amounts, it can prevent indigestion and can strengthen the organism. It is also recommended in cases of bilious complaints. It is taken orally in cases of fast heartbeat and stress. The plant is located in Bulgaria's most symbolic places, Rila Mountains and is grown in the gardens of the monks from the Rila Monastery. The folk medicinal use is derived from the healing experience of the Rila Monastery monks and St. Ivan Rilski, the founder of Rila Monastery (Nedelcheva 2009, 2012a). Because of its severely limited spread, today the plant is mostly unknown to the Bulgarians and its use has been forgotten, too.

4.3.3.3 Other Relevant Taxa

Because of the popularity of some plants as decorative, their curative properties are well known (see Table 4.1, 4). Marigold (*Calendula officinalis*) is a naturalized plant with wide use mostly for skin diseases. The plants from the immediate living

environment as ruderal and weeds are also among the well known and widely used (see Table 4.1, 5 and 6). Despite being widespread, lavender (*Lavandula* spp.), unlike in many countries in the Mediterranean, Western and Central Europe, is not popular in folk medicine and has a limited use (dried stalks are put between clothes and blankets in chests to prevent moths).

4.3.4 Cultivated Crop Plants

No matter when and in what way cultivated plants penetrated and started to be grown, they have become part of the Bulgarian way of life, and many of them are highly appreciated and have a high index for being mentioned for curative use (see Table 4.1, 7). Large numbers of food plants are used for their medical properties too (see Table 4.1, 7.1). Undoubtedly, garlic (*Allium sativum*) takes first place. A preventive means, charm, magical and curative properties, cleaning of blood, universal counter-poison, there is not a single group of diseases for which there is a cure in which garlic is not included. With almost the same importance as a curative method is onion (*Allium cepa*). Onion occupies an important place in the diet of Bulgarians and takes part in many national recipes. Very popular is the use of spices (savoury, mint, dill, parsley, celery), both as a corrective in the medicines prepared and its healing effect (see Table 4.1, 7.2). The fruits of Apiaceae and Brassicaceae species are also well known and used.

4.3.5 Asian Medicinal Plants

Asian medicinal plants (AMPs) are an integral part of the Bulgarian traditions and folk botanical knowledge and have had their place on the Bulgarian market from the past until now. More than 30 species were used for different purposes in the past (see Table 4.1, 8; Nedelcheva 2012b). These are mainly species used as spices or foods and are found in many traditional recipes (see Table 4.1, 8.1). This can be confirmed by written sources, mainly from the period of the Bulgarian Renaissance, and reflect the strong influence of Ottoman cuisine and folk medicine. A number of ethnographic sources confirm the strong involvement of "alien" plants originating from Asia on the market at that time. A lot of studies on the Bulgarian style of living and culture of those days support the finding about substantial involvement of alien plants in the daily life of Bulgarians at the time of the Ottoman Empire. Some of them such as black pepper, cloves, cinnamon, licorice, black tea, ginseng, etc., are still popular and widely used today. As for other species, the market relations in the last century led to their exclusion or severe limitation in use—curcuma, cardamom, ginger and saffron. Today, these plants are going through a new stage of rediscovery as foods and spices, as well as ingredients of herbal products and food additives.

A small group of species was previously known only as ornamental urban flora and not as medicinal one (see Table 4.1, 8.2). A typical example of the latter is

ginkgo (*Ginkgo biloba*). Twenty years ago, it was a rare park tree. As a result of increased media advertising and the penetration of a large number of medicinal products based on ginkgo, today it is one of the most popular medicinal plants and is used a lot.

Most of the AMP are completely unknown to the users and appear on the market for the first time as a component of herbal products (see Table 4.1, 8.3). A large number of them are found in the compounds of combined herbal products, and their presence can be determined as rare or low. They do not have any influence and participation in the use of alternative sources of treatment yet. Perhaps it is only a matter of time for some of them to get greater market participation. An advent of new combinations and mixtures containing traditional herbs for both Bulgarian and Asian traditional medicine is being observed. Often, in order to strengthen the effect of the traditional herbal mixtures, an extract or drug of a plant having an Asian origin is added (Nedelcheva 2012b).

4.3.6 Medicinal Use of Tree Saps

There is no known data in Bulgaria on the use of tree saps for fresh drinks or to obtain secondary products, unlike many other countries in Europe. On the other hand, in some Bulgarian traditions, some tree saps are used for medicinal purposes. One well known cure for sore eyes is drops of the sap of a freshly pruned vine (*Vitis vinifera*). Sometimes, the sap is collected in glass bottles for medicine when needed (Georgiev 1999; Nikolov 2006; Svanberg et al. 2012).

4.3.7 Other Medicinal Uses

Together with its effect, some plants find application in healing practice because of their mechanic qualities and properties. For example, barrels are prepared from the stems of the species of Apiaceae, Cyperaceae and Poaceae families. In cases of sore throat, powder of dried sumach (*Cotinus coggygria*) is blown into the throat through a barrel made of hemlock (*Conium maculatum* L.). Splints are prepared from lime tree barks. In many of the folk healing methods, plant coal is used, most often prepared from lime tree (*Tilia* spp.).

Mowing time coincides with the period of blossoming and picking of healing herbs. Thus, the grass mown and dried for fodder finds its place in a number of ritual practices but is also used in the preparation of potions, baths, etc. (Georgiev 1999).

4.3.8 Ritual and Symbolic Plants in the Medical Practices

According to folk beliefs, plants with a strong smell such as garlic and wormwood (*Artemisia* spp.) make a person unapproachable to evil powers (see Table 4.1, 9). Finely cut lemon balm (*Melissa officinalis*) is put next to the head for a headache at night (Georgiev 1999). Though with a more limited application, the use of aromas not only as a corrective in healing products shows the multifaceted folk knowledge of plants and is related to the contemporary outlook on aromatherapy.

Wearing charms (amulets) also belongs to the attempts of preventive significance. They are most often compiled of plants: strings of garlic cloves (*Allium sativum*), hawthorn fruit (*Crataegus monogyna*), sweet chestnut seeds (*Castanea sativa*), common hawthorn flowers (*Centaurea cyanus*), black sesame seeds (*Sesamum indicum*), black pepper fruits (*Piper nigrum*), flakes of onion (*Allium cepa*), common cowslip flowers (*Primula veris*), pot marigold flowers (*Calendula officinalis*), peony flowers (*Paeonia* spp.) and sprig of basil (*Ocimum basilicum*). The herbs picked on St. John's Day have specific power. The blue bead is a universal charm (Stavreva 2007).

In Bulgarian ritual food at Christmas Eve, the dried fruits of apple, plum, pear and the dried fruit compote prepared from them are included. They have been used as a healing method, too. As a costive means, dried pears are eaten, dried plums are eaten as laxatives, and they are also used for epidural hematomas (bruises) and corns.

The best herb-picking time is also determined by ritual. "Many are the illnesses, soft spots in the body which people have learned to cure with herbs—77 and a half according to the legend. There is a cure for all of them, however none for the half. Therefore, 77 herbs are collected on St. John's Eve and for the unknown half we have to close our eyes and to pick any herb by chance. It is picked in half and hopefully it will be magical and healing" (Stavreva 2007). Herb-picking mainly took place on St. George's day (May 6), the day of the Christian Saints Kosma and Damyan (July 1) and most of all on St. John's Eve (June 24). In many places in Bulgaria, these days are celebrated according to local traditions mainly with a symbolic character and are known as days of herbs, herbalists and folk healers. All these herbs are tied in a magical St. John's bunch, and if anyone happens to fall victim to an unknown disease or desire during the year, nervousness or a nervous fit, troubled sleep, or fright, the herbs in the bunch namely will help him or her rise to their feet. In order to be healing, the herbs must be picked on the way forward and not the way back. For serious cases, when nothing else has helped, a bunch of crane's bill, basil and others is put under the pillow. Boiling secret herbs in seclusion is a practiced magical ritual for prevention (Stavreva 2007).

For part of the plants, their use is connected with ritual importance and, in most cases, their use covers a wide range of diseases. According to folk beliefs, geranium (*Geranium* spp.) is a sign of health and happiness, although there is a dispute for supremacy between geranium and basil. Basil is first in the church, but geranium is most often found in blessings and different rites and rituals from the cycles of

Fig. 4.1 "Enyova kitka" (*Galium verum*, *Achillea* sp. and *Origanum vulgare*): the bunch gathered at St. John's Day, June 24 (in Bulgarian "Enyovden"), stored throughout the whole year and used as a cure for serious and unclear diseases. (Photo from Klisurski Monastery, 2013)

the calendar and life. The widest participation using geranium is in spring rituals. A potion from geranium is recommended for drinking and sprinkling for every disease. An infusion of the herb in water or wine is used for high blood pressure; a leaf is eaten per day, for pain in the heart, stomach ache and purification of the blood. There should be no seeds in the infusion, because they cause goitre. In folk medicine, the use of the different kinds of geranium is discovered and differentiated (Georgiev 1999; Marinov 2003).

Lady's bedstraw (*Gallium* spp.) has given the name of the special day for herb-picking: St. John's Day, June 24th (in Bulgarian "Enyovden"). At St. John's Eve, the stars come down and present all grasses and flowers with a huge healing power. The plant is ritually picked at dawn on St. John's Eve. The bunch gathered is stored throughout the whole year and can be used as a cure for serious and unclear diseases (Fig. 4.1). Today, this holiday of the herbs is very popular, and in many regions, its celebration has started again, but meanwhile, the plant lady's bedstraw is barely recognizable by people.

Many plants (mainly ether oil yielding plants and aromatics) which have a ritual importance are connected with a lot of and different local beliefs and, at the same time, have very wide application as healing methods because of their properties and their aroma: basil (*Ocimum basilicum*).

Where Belladonna grows (*Atropa belladonna*), it dries even old beech trees and nothing grows around; if its fruit falls on the root of a tree, it dries. The plant is only used exceptionally upon the consent of the person who is ill because there is a chance for going mad for a while. People believe in the power of the herb to treat all illnesses. The name Belladonna shows awe, a special attitude and referring to

this plant. This plant has another symbolic meaning, too, for Bulgarian medicinal ethnobotany. The story is interesting how at the beginning of the last century during an encephalitis epidemic in Italy (lethargic encephalitis; 1916–1926), thanks to Queen Helen of Savoy, an original method was applied affecting post-encephalitis Parkinsonism of those who recovered from the illness. A crude extract from the roots of the herb Belladonna was used in white wine applied by the Bulgarian folk healer Ivan Raev. It is used for other forms of Parkinsonism too. Even today in world science, this method is used under the name "Bulgarian treatment", "*Cura bulgara*". By the beginning of the 1940s, most patients were being treated using Belladonna alkaloids (Weisker 2012). The plant has a very low index of mentioning by informants, and its legendary history is little known today.

Exactly the opposite is the story of one of the most popular healing plants in Bulgaria today: summer snowflake *Leucojum aestivum* L., which has a very limited distribution, being found only in 11 places in Bulgaria. In the middle of the twentieth century, a Bulgarian scientist discovered and applied the treatment of poliomyelitis with galantamine extracted from the bulbs of the plant. There are not any known ethnobotanical data for its use in the past. Its intensive picking in the 1970s and 1980s led to a great damage to its populations. Today, it is an object of cultivation and research. This is the plant with the most legislative acts for protection, and special terms for use (Gussev et al. 2003).

4.3.9 Painkillers and Pain Relievers

One of the symptoms which demand immediate reaction is pain. In folk recipes, descriptive expressive means are usually used in order for the character of pain to be detailed and localized so that the right herbs could be selected. Such are the cases of toothache, earache and pain in the eye. One of the plants often used is a type with alkaloids in which inhalation "incensing" of the sick person is used. They are herbs with anaesthetic effects, mostly used for toothache: henbane (*Hyosciamus niger*) and thorn apple (*Datura stramonium*).

4.3.10 Gynaecological Plants

The use of plants for a wide range of indispositions is amplified by their application as an abortive means such as the seeds of *Ricinus communis* L., *Humulus lupulus, Datura stramonium* L., *Nerium oleander* L., *Dioscorea communis* (L.) Caddick & Wilkin. and *Claviceps purpurea,* knowing that they are highly poisonous. The mechanic activity of a stalk of pelargonium (*Pelargonium zonale* (L.) L'Hér.) is known as a preventative medicine.

4.3.11 Tonics

A large number of plants are included in recipes with a general tonic action. The composition usually varies in the different regions. These cures are known by healers as ointments, balms or treacles ("madzhun"). They are usually prepared with a basis of bee honey and added seeds or finely cut roots. A large part of these preventing and tonic cures for the organism are still used today and even kept in family recipes.

4.3.12 Foods

The healthy dietary consumption of food in a large number of the recipes is part of the combinative treatment, but it also occupies a separate place as a preventive measure (Petkova 2007; Nedelcheva 2012a, 2013). It is often mentioned not to eat sour, salty, or spicy food. In recipe books, preventative purification of the body is often discussed. On the day of healing intestinal worms with male fern, nothing else is eaten except for pumpkin seeds.

4.3.13 Other Ingredients

Other components in folk recipes include wax, olive oil, "rakia" (alcoholic beverage produced by distillation of fermented fruit), blue vitriol, white and red wine, bee honey, alum, vinegar, fuller's earth, incense, sulphur, salt, blue vitriol, amber, vinegar, flour, egg, mastic brandy, quicklime, camphor, etc. (Nedelcheva 2012a).

4.3.14 Plant Names

The names of plants that clearly point to a specific illness are very few. This is logical when keeping in mind folk knowledge on medicinal nomenclature (Ahtarov et al. 1939; Nedelcheva and Dogan 2009). Folk names most of all reflect the association with typical characteristic of the plants. Instead of one-layer names, in a number of cases, complex sentences are used, generating in themselves a complex plot because they not only enumerate characteristics but they vividly portray the picture of the illness condition. But many names of plants are given according to the illnesses which are cured by the plants: "zarasliche" for wound healing (*Symphytum officinale*), "zabova treva" grass for teeth (*Hyoscyamus niger*), "besniche" for rabies (*Digitalis lanata*), "ochanka" for eyes (*Eufrasia officinalis*), "ochibolets" for eye pain (*Potentilla* spp.), "maichin list" mother leaf (*Cassia acutifolia*), "krastaviche" for scabies (*Borrago officinalis*), "lisheiniche" for skin diseases (*Chelidonium*

majus), "ushno bile" for ear pain (*Sempervivum* spp.), etc. *Chelidonium majus* has more than 20 folk names, most of which refer to the skin diseases that it treats.

Unfortunately, with the development of biomedical nomenclature, people more rarely resort to the old names of the symptoms, illnesses and respective plants. Therefore, a large part of these names naturally fall out of use. Along with this the tendency for replacing established names of plants with transliteration of the Latin ones, for example, cassia, betonica, is clearly attested. Even in the creation of authentic local products, folk names are replaced with scientific because the transliterated originals are spelled in a difficult way and present an opportunity for double spelling and pronunciation. This is one of the factors for the gradual disappearance of linguistic differences these days.

Household realia, most often products from agricultural crops, sometimes reflect a measure when preparing pills, or determining the quality for a single dosage "pills like chickpeas" *Cicer arietinum,* "pills lentil larger" *Lens culinaris,* "pills like peas" *Pisum sativum* (pea), "pills like garden vetch" *Vicia sativa,* "make pills like common bean" *Phaseolus vulgaris,* "pills like black pepper" *Piper nigrum,* "pills like hazelnut" *Corylus avellana.* Also very common is the comparison of "pills like bullets" (Nedelcheva 2012a).

4.4 Bulgarian Medical Ethnobotany: One of the Most Logical and Natural Approaches for the Modern Natural Lifestyle

Plants and their use in healing have never lost their importance for the Bulgarians as well as for many nations in the Balkans (Pieroni et al. 2011; Mustafa et al. 2012; Quave et al. 2012). They are part of the Bulgarian collective thinking, intertwined with the folk rituals, language and daily life, which are a solid foundation for getting to know the surrounding world and to strive for a better life. The conditions of combining ancient knowledge, pagan world outlook and Christian thinking, and being placed at the crossroads of the Balkans, resulted in the unique character of Bulgarian medicinal ethnobotany.

Contemporary ethnobotanical medical research is fortunate to have at their disposal old documentary sources, manuscripts and artifacts that are well preserved and studied from a historical, ethnographical and linguistic point of view. The ethnobotanical studies on them give the opportunity for analysis from another point of view and present a new and valuable botanical, medical information and also add to the data for sociocultural processes from the respective period as it is evident from the contemporary ethnobotanical sources.

The diversity of plants used in healing practices has a dynamic character. It is intimately connected with the processes in society and its historical and social development. Despite this, a few species are constantly mentioned in documentary sources and by local people. These are widely spread plants, easily accessible and

recognized and used for the most common complaints, accompanying a number of illnesses. Together with the wild Bulgarian flora, here a lot of cultivated plants are included. These are the species whose use is preserved for the community irrespective of migration processes. These are species with potential importance for the sustainable expansion into multicultural Europe. A specific group of plants with their own history are the Asian healing plants. They are a "well-forgotten" tradition that is developing quickly and aggressively today. Research on old manuscripts and the comparison with ethnobotanical data from recent fieldwork has shown their significant participation in the period until the beginning of last century. Followed by years of a gradual limitation and their participation as a healing method until the 1990s, after which a quick and progressive invasion followed in people's daily life, including participation in a lot of new methods of a mixed character. Today, most of these well-known plants are perceived and shown as new and exotic healing methods. They affect contemporary, alternative and complementary medicine, but in most cases detract from the traditions of the Bulgarians. Knowing, studying, tracing and why not supporting these processes in a direction of cultural sensitiveness are of paramount importance for preserving the traditional knowledge and national identity.

For the past decades, a tendency has been observed towards developing Bulgarian populations of species which are sought at the market. Very often, these are plants for which there is no traditional use, but there is a trade interest, and they could be treated as species with economic importance. Too much interest in a species always leads to stronger exploitation of the places where it is found, and as a result, they need protective measures. In the annually published list of healing plants under a special regime of preservation and use, the percentage of species which are often mentioned in ethnobotanical data is very little. These are mostly species with a contemporary trade interest in them.

4.5 Future Directions

Due to historical circumstances, an extensively preserved traditional way of life (rural, agriculture-based local economies) in close proximity to nature, including also the use of herbs as one of the main healing methods, can still be found today in Bulgarian villages and communities. There is an awareness of the necessity of ethnobotanical field studies with direct contact with people and application of the contemporary methods of multicultural ethnobotanical analysis.

As early as the last century, the Bulgarian enlightener and folk scientist Tsani Ginchev said it precisely and clearly: "To be willing to write and not to find among our people what to write about, where every village is history, every old woman an epic and every old man-annals, it will mean that you do not want and nothing more". Although written more than a century ago, these words are still current and prophetic.

The ethnobotanical studies on multiethnic regions are still sporadic and insufficient. Moreover, today migration processes are very clearly ongoing. A general overview of Bulgarian medical ethnobotany shows some less studied topics regarding multiethnic areas, immigrant communities, referrals to neighbouring regions for which data are still sparse. The processes of erosion in traditional knowledge are apparent: the use of a number of plants and practices connected with them fall out of use, the traditional plants-symbols are replaced, folk names are replaced, forgotten traditional products are today promoted as new and exotic in healing practices and medicine plants imported from other global sources are introduced and mixed. These are quick and irreversible processes of acculturation. They cannot be stopped, but they could be opposed to a strong and attractive process of interest in the traditional plant-based healing practices.

The change in thinking and philosophy of the contemporary individual towards a life oriented to nature through recognition of complementary and alternative medicine and the search for identity in the processes of globalization through the development of ecotourism are the opportunity given to us for presenting traditional ethnobotanical knowledge as current, necessary and important in our contemporary daily life. Thus, the question remains: is not our desire for a modern natural lifestyle a well-forgotten plant-based tradition, and isn't ethnobotanical knowledge one of the most logical and natural approaches for its characterization and achievement? Bulgarian medical ethnobotany gives a clear positive answer to this question.

References

Ahtarov B, Davidov B, Yavashev A (1939) Materiali za Balgarski botanichen rechnik (Materials for the Bulgarian botanical glossary). Balgarska Akademia na Naukite Pridvorna Pechatnitsa, Sofia

Anonymous (2000) Zakon za lechebnite rastenia (Law of the medicinal plants. DW/29-2000). MOEW, The Ministry of Environment & Water (MOEW), Bulgaria. Database of the Bulgarian Biodiversity Foundation. http://www.biodiversity.bg/files/File/zak_bg_lech-rast.pdf. Accessed 21 July 2000

Anonymous (2011) Population census the Republic of Bulgaria (Final data). National statistical institute Republic of Bulgaria. http://www.nsi.bg/census2011/PDOCS2/Census2011final_en.pdf. Accessed 18 March 2011

Anonymous (2013) Zapoved RD-65/28.01.2013 za specialnia rezhim na opazvane i polzvane na lechebnite rastenia (Order RD-65/28.01.2013 on the specific arrangements for the conservation and use of medicinal plants in 2013). MOEW, The Ministry of Environment & Water (MOEW), Bulgaria. http://www.riosvt.org/docs/bio/2013/02/Zapoved-bilki_2013.pdf. Accessed 23 March 2013

Apostolov M, Georgiev M, Kaimakchieva R, Tachev TS (1982) Iz istoriyata na estestvoznanieto v Bulgaria (From the history of natural science in Bulgaria). Narodna prosveta, Sofia

Assyov B, Petrova A, Dimitrov D, Vassilev R (2012) Conspectus of the Bulgarian vascular flora. Distribution maps and floristic elements. Bulgarian Biodiversity Foundation, Sofia

Evstatieva L, Hardalova R, Stoyanova K (2007) Medicinal plants in Bulgaria: diversity, legislation, conservation and trade. Phytol Balc 13(3):415–427

Gecheva K (2007) Bogomilstvoto. Bibliografia (Bogomilism. Bibliography). IK Gutenberg, Sofia

Georgiev M (ed) (1999) Enciklopedia na balgarskata narodna medicina (Encyclopedia of Bulgarian Folk Medicine). Petar Beron, Sofia
Georgiev M (2011) Starobalgarska medicina (Old Bulgarian medicine). Marin Drinov, Sofia
Ginchev Ts (1988) Po nyakolko dumi: za zanayatite, bilkarstvoto i poveriyata na balgarskia narod (In a few words: for crafts, herbalism and beliefs of Bulgarians). Zemizdat, Sofia
Gussev Ch, Uzunov D, Bosseva Y, Stoeva T, Stanilova M, Burrus M (2003) Conservation of *Leucojum aestivum* (Amaryllidaceae) in Bulgaria. Bocconea 16(2):815–821
Ivancheva S, Stancheva B (2000) Ethnobotanical inventory of medicinal plants in Bulgaria. J Ethnopharmacol 69(2):165–172
Marinov D (2003) Izbrani proizvedenia. 1.2 Religiozni narodni obichai. (Selected works. 1.2 Religious folk customs.). Iztok-Zapad, Sofia
Miltenova A, Kirilova A (1994) Srednovekovni lekovnici i amuleti (Medieval medical books and amulets). Vreme, Sofia
Mustafa B, Hajdari A, Krasniqi F, Hoxha E, Ademi H, Quave CL, Pieroni A (2012) Medical ethnobotany of the Albanian Alps in Kosovo. J Ethnobiol Ethnomed 6:8
Nedelcheva AM (2009) Plants related to the life and medicinal practice of St. Ivan Rilski. In: Morel JP, Mercuri AM (eds) Plants and culture: seeds of the cultural heritage of Europe. Edipuglia, Bari, pp 175–178
Nedelcheva A (2012a) Medicinal plants from an old Bulgarian medical book. J Med Plants Res 6(12):2324–2339
Nedelcheva A (2012b) Traditional knowledge and modern trends for Asian medicinal plants in Bulgaria from an ethnobotanical view. Eurasia J Biosci 6:60–69
Nedelcheva A (2013) An ethnobotanical study of wild edible plants in Bulgaria. Eurasia J Biosci 7:77–94
Nedelcheva AM, Dogan Y (2009) Folk botanical nomenclature and classification in Bulgarian traditional knowledge. In: Morel JP, Mercuri AM (eds) Plants and culture: seeds of the cultural heritage of Europe. Edipuglia, Bari, pp 169–173
Nikolov S (ed) (2006) Specializirana enciklopedia na lechebnite rastenia v Bulgaria (Specialized encilopedy of medicinal plants in Bulgaria). Trud, Sofia
Petkova S (2007) Srednovekovnite lekovnici. Specifica na kulturnoto izrazyavane (Medieval medical manuscripts: specificity of cultural expression). Medieval Bulgarian Literature 37–38:208–227
Petkova S (2008) Reklamni poslania v rakopisnite lekovnici ot srednovekovieto ("Creatives" from medical manuscript in medieval centuries). http://liternet.bg/publish23/s_petkova/reklamni.htm. Accessed 25 July 2008
Petrova A (ed) (2006) Atlas of Bulgarian endemic plants. Gea-Libris, Sofia
Petrova A, Vladimirov V (eds) (2009) Red list of Bulgarian vascular plants. Phytol Balc 15(1):63–94
Petrova A, Vladimirov V (2010) Balkan endemics in the Bulgarian flora. Phytol Balc 16(2):293–311
Pieroni A, Quave C, Giusti ME (2011) Cross-cultural ethnobiology in the Western Balkans: medical ethnobotany and ethnozoology among Albanians and Serbs in the Pešter plateau, Sandžak, south-western Serbia. Hum Ecol 39:333–349
Quave CL, Pardo de Santayana M, Pieroni A (2012) Medical ethnobotany in Europe: from field ethnography to a more culturally sensitive evidence-based CAM? Evid Based Complement Alternat Med ID 156846
Stavreva L (2007) Balgarski magii i gadania (Bulgarian spells and enchantments). Trud, Sofia
Stojanov N, Kitanov B (1960) Wild useful plants in Bulgaria. Bulgarian Academy of Science, Sofia
Stranski I (1963) Wild and culture plants in Bulgaria. BAN, Sofia
Svanberg I, Sõukand R, Łuczaj Ł, Kalle R, Zyryanova O, Andrea D, Papp N, Nedelcheva A, Šeškauskaitė D, Kołodziejska-Degórska I, Kolosova V (2012) Uses of tree saps in northern and eastern Europe. Acta Soc Bot Pol 81(4):343–357
Tarnanidis I (1988) The Slavonic manuscripts discovered in 1975 at St. Catherine's monastery on mount Sinai. Hellenic Association for Slavic Studies, Thessaloniki

Velcheva B (1988) Novootkriti rakopisi v Sinaiski manastir “Sv. Ekaterina” (Newly manuscripts from Sinai monastery St. Catherine). Palaeobulgarica 12(3):126–129
Velcheva B (1991) Novootkrit lekarstvenik, napisan na glagolitsa (Newly medical manuscript written in Glagolitic). Medieval Bulgarian Literature 25–26:95–97
Weisker A (2012) Die Klinik, die Kur und die Königin. Schattauer GmbH, Stuttgart

Chapter 5
Cross-Cultural Ethnobotany of the Sharr Mountains (Northwestern Macedonia)

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5.1 Introduction

In very recent years, the South Balkan region has become the focus of a number of ethnobotanical studies (Jarić et al. 2007; Redzic 2007; Pieroni 2008; Nedelcheva and Dogan 2009; de Boer 2010; Pieroni 2010; Redzic 2010; Šarić-Kundalić et al. 2010; Menković et al. 2011; Mustafa et al. 2011; Nedelcheva and Dogan 2011; Šarić-Kundalić et al. 2011; Mustafa et al. 2012; additionally, see the other chapters in this volume, and references therein). One of the reasons for this increase in interest is related to the historical appeal that this area has had to the Western herbal

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market. In fact, the Balkans have served as the primary European "sanctuary" of wild and cultivated medicinal and aromatic plants for a few centuries, and this is a tradition that continues today. This has recently raised concerns about the long-term sustainability of this exploitation, and an issue, which has emerged as a point of great interest among modern ethnobiologists, is that perspectives of the local populations regarding natural resources must be carefully considered in order to successfully implement bioconservation initiatives. These emic perspectives embrace a broad set of skills, beliefs, and practices that concern a significant portion of the traditional ecological knowledge (TEK).

5.1.1 Floristic Diversity of the Sharr Mountain Range

Nevertheless, in the Republic of Macedonia, no field studies concerning the relationship between plants and humans were conducted until 2009. This study was conceived and focused on the local plant knowledge within one of the highest and largest mountainous ranges of the South Balkans: the Sharr Mountains (in Macedonian better known as Šar Planina). The Sharr Mountain range is a zone of sub-Mediterranean and continental climate and has many plant endemisms, relictual, rare, and endangered species in the Republic of Macedonia. According to the results of research on the floral diversity, this mountain range harbors over 2000 vascular plant species and approximately 150 endemic species. A significant portion of plants have pan-Balkan distribution (e.g., *Lilium albanicum* Griseb., *Sideritis scardica* Griseb., *Geum coccineum* Sibth. & Sm., *Trifolium noricum* Wulf.), while some other 20 species are limited only to this region (*Achillea alexandri-regis* fo. *holosericiformis* N. Diklic, V. Stevanovic & M. Niketic, *Anthyllis scardica* Wettst., *Crocus scardicus* Kosanin, *Onobrychis montana* subsp. *scardica* (Griseb.) P.W. Ball, *Sideritis scardica* Griseb., *Verbascum scardicola* Bornm., *Viola schariensis* Erben, etc.). As can be seen from the aforementioned taxa, a significant proportion of endemic plants in the scientific terminology are reported as *scardica,* which refers to the old name of this mountain, which appears on the ancient maps as "Scardus."

According to UNEP Feasibility Study (UNEP 2010), 32 plant species found on the Sharr Mountains are listed on the International Union for conservation of Nature and Natural Resources (IUCN) Red List of Threatened Plants, while 26 species are included on the European Red List. If the flora of the Sharr Mountains (Fig. 5.1) is considered to be the richest on the Balkan Peninsula, the same can be said for its cultural diversity. Thus, the intent of the present study was to explore the medicinal perceptions of local plants among three ethnic groups living in the villages on the Macedonian side of the Sharr Mountains: Macedonians, Albanians, and Gorani.

5.1.2 Cultural and Linguistic Diversity in South-Western Balkans

Macedonians—the main ethnic group of the country—are Slavs who descended from the peoples who arrived in the Balkans in the sixth and seventh centuries and

Fig. 5.1 Sharr Mountains as seen from Macedonia. (Photo courtesy of B. Rexhepi)

currently the large majority of this group has a Christian Orthodox faith. Albanians in Republic of Macedonia are native people who trace their ancestry from the ancient Illyrians. Actually, they represent the largest ethnic minority in Macedonia, in agreement to the date of the national census 2002. The Gorani people represent instead a tiny ethnic South-Slavic minority of Muslim faith, spread among a few dozen mountainous villages in Albania, Kosovo, and Macedonia. The Gorani speak a unique dialect, defined locally as "našinski," which is a Torlakian transitional dialect between the Bulgarian/Macedonian language group and the Serbo-Croatian language.

Both Albanians and Gorani are bilingual in Macedonian; Macedonian and Gorani community understand each other in their own languages, given their similarity, while Albanians—especially the elderly and mid-generation—are bilingual in Macedonian. Many socio-political changes have occurred in this region over the last decade, and these have caused a rapid decline in the number of farmers in this zone and a massive phenomenon of migration to urban centers. However, there are still a small number of local people who pursue a traditional way of life and currently reside in mountainous villages located at elevations greater than 1000 m.a.s.l.

5.2 The Field Study

The main authors of this chapter conducted an ethnobiological study (recently published in Rexhepi et al. 2013) with the following objectives: (1) document and explore the ethnobotanical knowledge related to the use of plants in local folk medical practices and eventually local wild plants used in the diet, (2) compare the data gathered within the three ethnic groups, and (3) compare the collected data with those found in a few other ethnobotanical surveys recently conducted in the Western Balkans in order to assess commonalities and disparities in current patterns of plant use.

The field study was conducted by selecting participants from among local farmers, healers, and elderly people who still retain traditional knowledge concerning medicinal plants. The majority of the youngest and mid-aged population has already

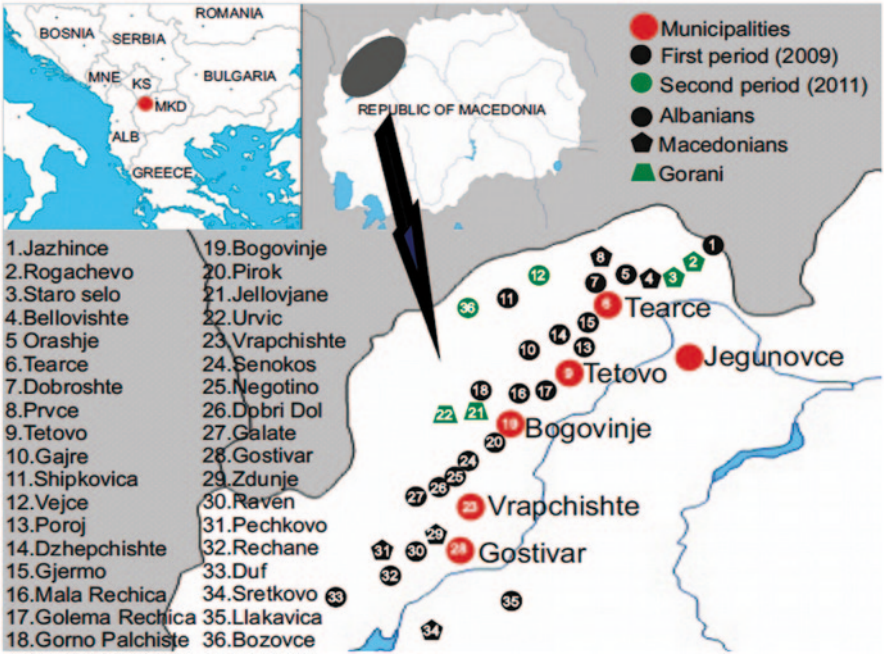

Fig. 5.2 Map of the study area and villages

left the villages due to difficult economic situations and has either settled into larger towns or gone abroad. The study was carried out over two periods: The first field work was undertaken from March to September 2009, and interviews were conducted in 35 villages (Fig. 5.2), each of which is home to a few hundred inhabitants. The survey was conducted by administering a questionnaire to 221 locals over 55 years old and of diverse ethnicity: 160 were (Muslim) Albanians, 35 (Orthodox) Macedonians, and 26 were (Muslim) Gorani. The number of the participants reflected the proportion of the three ethnic groups in the study area. However, in order to compare the plant knowledge of the three communities, a second field study took place in 2011 in six villages and was conducted by performing 30 in-depth interviews with ten members of the (Muslim) Albanian community, ten (Orthodox) Macedonians, and ten Gorani. In both studies, approximately one-third of the selected villages are located in the higher elevations of the mountains.

Informants were asked about their age and ethnicity, while for each quoted plant, local names and exact details about its preparation, and local medicinal or food uses were recorded. Moreover, informants were asked about food uses of wild species, as well as their perceived vulnerability (i.e., informants were asked if they thought that the plant was endangered or threatened due to over-collection), and the eventual occurrence of a trade of the plants in local or larger markets.

Prior informed consent was obtained for all interviews, and the field studies followed the Code of Ethics of the International Society of Ethnobiology (ISE 2006). Taxonomic identification of plants follows standard references for the Macedonian

flora and mushrooms (Micevski 1985–2005; Karadelev 2001). Plant family assignments follow the current guidelines of the Angiosperm Phylogeny Group (III). Voucher specimens were collected, deposited, and entered into a database at the State University of Tetova (Republic of Macedonia).

5.3 Results and Discussion

5.3.1 Medicinal Plant Uses in the Sharr Mountains

Table 5.1 (extracted from Rexhepi et al. 2013) reports the results of the recorded medicinal plants quoted by the study participants. Seventy-six species (belonging to 34 families), mainly wild, were found. Of these, a couple dozen (*Achillea millefolium* L., *Castanea sativa* Mill., *Centaurium umbellatum* Gilib., *Cornus mas* L., *Fragaria vesca* L., *Hypericum perforatum* L., *Helianthus tuberosus* L., *Juglans regia* L., *Juniperus communis* L., *Malva sylvestris* L., *Matricaria recutita* L., *Mentha piperita* L., *Morus nigra* L., *Ocimum basilicum* L., *Origanum vulgare* L., *Rosa canina* L., *Rubus ulmifolius* Schott., *Sambucus nigra* L., *Sideritis scardica* Griseb., *Tilia cordata* Mill., *Urtica dioica* L. and *Vaccinium myrtillus* L.) were cited by more than half of the informants. The most frequently cited families were Lamiaceae (15.7%), Asteraceae (14.4%), Rosaceae (5.2%), Malvaceae (5.2%), and Fabaceae (5.2%). The most frequently cited medicinal uses referred to treatment of respiratory system conditions (46%). This may also account for the most common diseases (cold, flu, bronchitis), which are related to the harsh winter climate of this region.

A few wild or semi-domesticated medicinal plants were quoted also for food purposes. Among these findings, the uncommon uses of *Ballota nigra* L. (leaves) tea as a digestive, of *Convolvulus arvensis* L. (aerial parts) tea for hypertension, of *Chenopodium urbicum* L. leaves (topically applied) for treating hemorrhoids, and *Cornus sanguinea* L. (leaves and fruits) tea against stomachaches could be of interest for further phytopharmacological studies. A large majority of medicinal plants in the Sharr Mountains are used in the form of teas/infusions (85%), thus probably confirming the crucial role played by the period of Ottoman domination in spreading the use of "home-made teas." These "home-made teas" were used as a substitute for the imported black tea used by the upper classes, whose consumption spread throughout Turkey, especially in the second half of the nineteenth century (Aylangan, 2011).

5.3.2 Cross-Cultural Comparison

The overlap of medicinal plants quoted in the second field study, where an equal number of members of the three communities participated in in-depth interviews concerning plant TEK, is illustrated in Fig. 5.3. These findings reflect that the Gorani seem to share nearly all of their medicinal plants in common with Albanians,

Table 5.1 Local uses of medicinal plants in the Macedonian side of the Sharr Mountain[a]

Botanical taxon/ taxa, family and voucher specimen	Status	Used parts(s)	Preparation and administration	Local medical use(s)	Quotation frequency	Vulnerability of species	Pharmaceutical market	Local market	Use(s) recorded among		
									Albanian	Macedonian	Gorani
Achillea millefolium L. (Asteraceae) MSHACMI055	W	APd	I: tea E: directly to wound as hemostyptic powder for hemorrhoids	E: wound healing (ulcers) I: internal and external hemorrhoids	***	–	+	+	+	+	+
Allium ursinum L. (Amaryllidaceae) MSHALUR111	C	L; Fl	I:macerated in raki	Cardiovascular system (to improve blood flow)	*	–	–	+	–	–	+
Althaea officinalis L. (Malvaceae) MSHALOF211	W	APd	I:tea	Respiratory system problems (fever, cold, influenza)	***	–	+	+	+	+	+
Althaea rosea (L.) Cav. (Malvaceae) MSHALRO115	W	APf	I: tea	For respiratory system problems (bronchitis and asthma)	*	–	–	–	+	–	+
Arctium lappa L. (Asteraceae) MSHARLA311	W	L; S; R; Se	I:prepared in mixed dishes with fruits and meat	To improve health in general, urinary tract disorders	**	–	–	–	+	+	–
Ballota nigra L. (Lamiaceae) MSHBANI065	W	Lf	I: tea	Vomiting and digestive problems (gastritis)	**	–	–	–	+	–	–
Bellis perennis L. (Asteraceae) MSHBEPE411	W	Fl	I:tea E: directly applied to stop bleeding	Antitussive	***	–	–	–	+	+	–
Brassica nigra (L.) W.D.J. Koch (Brassicaceae) MSHBRNI511	W	Fl	I: paste is prepared	To help body in general	*	+	–	–	+	–	–

Table 5.1 (continued)

Botanical taxon/ taxa, family and voucher specimen	Status	Used parts(s)	Preparation and administration	Local medical use(s)	Quotation frequency	Vulnerability of species	Pharmaceutical market	Local market	Use(s) recorded among		
									Albanian	Macedonian	Gorani
Calamintha grandiflora Pursh. (Lamiaceae) MSHCAGR611	W	L	I: tea	Antitussive and febrifuge	*	+	–	–	+	–	–
Capsella bursa-pastoris (L.) Medik (Brassicaceae) MSHCABUP405	W	APd	I: tea	To treat hypertension and also for respiratory problems (cough, influenza)	**	+	–	+	+	+	+
Carlina acaulis L. (Asteraceae) MSHCAAC711	W	Fl; R; S	E: decoction	E: to treat eczema and acne	*	–	–	–	+	+	–
Castanea sativa Mill. (Fagaceae) MSHCASA125	C; W	L; Fr	I: tea	Antitussive	***	–	–	–	+	+	+
Centaurium umbellatum Gilib. (Gentianaceae) MSHCAUM435	W	APd	I: tea	Digestive system problems and to treat anemia	***	–	–	+	+	+	–
Chelidonium majus L. (Papaveraceae) MSHCHMA811	W	APd	E: extract applied directly to wound	E: skin infections	*	–	–	–	+	+	–
Chenopodium urbicum L. (Amaranthaceae) MSHCHUR911	W	L	E: directly to wound	E: used to heal external hemorrhoids	**	–	–	–	+	+	–
Cichorium intybus L. (Asteraceae) MSHCIIN007	W	APD; APf	I: tea	Abdominal pain (stomach ache)	***	–	–	–	+	–	–

Table 5.1 (continued)

Botanical taxon/ taxa, family and voucher specimen	Status	Used parts(s)	Preparation and administration	Local medical use(s)	Quotation frequency	Vulnerability of species	Pharmaceutical market	Local market	Use(s) recorded among		
									Albanian	Macedonian	Gorani
Clematis vitalba L. (Ranunculaceae) MSHCLVI1011	W	L	E: directly to wound	E: skin infections	*	–	–	–	+	–	+
Convolvulus arvensis L. (Convolvulaceae) MSHCOAR485	W	APf	I: tea	For hypertension and to strengthen immunity	**	–	–	+	+	–	–
Coriandrum sativum L. (Apiaceae) MSHCOSA1111	C	L	I: eaten	To improve health in general	*	–	–	–	+	+	–
Cornus mas L. (Cornaceae) MSHCOMA010	C; W	Fr	I: juice (hoshaf)	To treat diarrhea in children and to increase appetite	***	–	–	–	+	–	+
Cornus sanguinea L. (Cornaceae) MSHCOSA445	W	L; Fr	I: tea	Abdominal pain (stomach ache)	***	+	–	+	+	–	–
Corylus avellana L. (Betulaceae) MSHCOAV135	C; W	L; Fr	I: strong tea	To reduce menstrual pain	***	–	–	–	+	–	+
Cynara cardunculus L. (Asteraceae) MSHCYCA1211	C	APf	I: tea	Cardiovascular system (to treat anemia) and to improve appetite	**	–	–	–	+	+	–
Daucus carota L. (Apiaceae) MSHDACA006	W	R; Fl; S	I: tea	To treat gastric ulcers and dysentery	***	–	+	+	+	+	+

Table 5.1 (continued)

Botanical taxon/ taxa, family and voucher specimen	Status	Used parts(s)	Preparation and administration	Local medical use(s)	Quotation frequency	Vulnerability of species	Pharmaceutical market	Local market	Use(s) recorded among		
									Albanian	Macedonian	Gorani
Equisetum arvense L. (Equisetaceae) MSHEQAR145	W	H	I: tea E: to stop internal bleeding directly to wound	Urogenital disorders and to stop internal bleeding E: applied directly to wound as hemostatic	*	+	–	+	–	+	–
Euphorbia cyparissias L. (Euphorbiaceae) MSHEUCY515	W	L	E: directly to warts	To remove warts from eyelid	**	–	+	+	+	–	–
Fragaria vesca L. (Rosaceae) MSHFRVE155	W	Fr; L	I: tea, juice E: directly to inflamed place	Digestive problems (gastritis) E: to treat external hemorrhoids as hemostyptic powder	***	+	–	+	+	+	–
Fraxinus angustifolia Vahl (Oleaceae) MSHFRAN495	W	L	E: directly to wound	Wound healing	*	–	–	–	+	–	–
Galega officinalis L. (Fabaceae) MSHGAOF004	W	Fl	I: tea	Diabetes	**	–	+	–	+	+	–
Galium verum L. (Rubiaceae) MSHGAVE019	W	APd	I: tea	Kidney and urinary problems	**	–	–	+	+	–	–
Gentiana lutea L. (Gentianaceae) MSHGELU1311	W	R; L; Fl	I: tea	To regulate temperature, respiratory system problems (influenza, cough)	**	+	+	–	+	–	+

Table 5.1 (continued)

Botanical taxon/ taxa, family and voucher specimen	Status	Used parts(s)	Preparation and administration	Local medical use(s)	Quotation frequency	Vulnerability of species	Pharmaceutical market	Local market	Use(s) recorded among		
									Albanian	Macedonian	Gorani
Hedera helix L. (Araliaceae) MSHHEHE165	W	L	E: applied directly as a compress	E: rheumatic disorder (rheumatisms)	***	+	–	–	+	+	–
Helianthus tuberosus L. (Asteraceae) MSHHETU1411	C	R	I: cooked dishes	To stimulate appetite and to improve heart contractility (cardiovascular system)	***	+	+	+	+	–	–
Helleborus odorus Waldst. & Kit. exWilld. (Ranunculaceae) MSHHEOD1511	W	APf	I: juice E: directly to the wound as a compress	E: Musculoskeletal system (rheumatism) I: juice to heal wounds in sheep	***	–	–	+	–	–	+
Hypericum perforatum L. (Hypericaceae) MSHHYPE075	W	APd	I: tea E: powder directly to wound, oil for hemorrhoids	I: general kidney pains (and to remove kidney stones), to treat internal and external hemorrhoids	***	–	+	+	+	+	+
Juglans regia L. (Juglandaceae) MSHJURE175	C	Fr; L	I: tea E: directly in to the wound	I: anti-anemic, digestive system problems (constipation) E: dermatological system (eczema, shingles and skin inflammation)	***	+	–	+	+	+	+
Juniperus communis L.(Cupressaceae) MSHJUCO185	W	Fr; L	I: tea E: directly	I: renal system (remove kidney stones) E: rheumatic disorders (rheumatisms)	***	+	+	+	+	–	+

Table 5.1 (continued)

Botanical taxon/ taxa, family and voucher specimen	Status	Used parts(s)	Preparation and administration	Local medical use(s)	Quotation frequency	Vulnerability of species	Pharmaceutical market	Local market	Use(s) recorded among		
									Albanian	Macedonian	Gorani
Juniperus oxycedrus L. (Cupressaceae) MSHJUOX1611	W	Fruit	I: tea, tincture, oil	Dermatological system (skin infections)	***	+	+	+	+	+	+
Ligustrum vulgare L. (Oleaceae) MSHLIVU195	W	APd	I: tea mixed with chamomile	Respiratory problems (cough and influenza)	*	+	+	+	+	–	–
Lythrum salicaria L. (Lythraceae) MSHLYSA205	C; W	AP	I: tea mixed with *Hypericum perforatum*	Internal hemorrhoids and to treat anemia	*	+	+	+	+	–	–
Malva sylvestris L. (Malvaceae) MSHMASI085	W	L	I:tea	Respiratory problems (bronchitis, asthma, emphysema)	***	–	–	–	+	+	+
Marrubium vulgare L. (Lamiaceae) MSHMAVU015	W	APd	I: tea	Appetite stimulant	*	–	–	+	+	–	–
Matricaria recutita L. (Asteraceae) MSHMARE057	W	APd	I: tea E: applied directly to the wound as extract	E: wound healing (ulcers of the skin and soft tissues) I: abdominal pain (stomachache), I: to reduce menstrual pain	***	–	–	–	+	+	+
Medicago sativa L. (Fabaceae) MSHMESA020	C	L	I: tea and tincture	Galactagogue	*	–	+	+	+	+	–
Melissa officinalis L. (Lamiaceae) MSHMEOF1711	SC	L	I: tea, oil	Cardiovascular system (heart problems), headaches	***	–	–	+	+	+	–

Table 5.1 (continued)

Botanical taxon/ taxa, family and voucher specimen	Status	Used parts(s)	Preparation and administration	Local medical use(s)	Quotation frequency	Vulnerability of species	Pharmaceutical market	Local market	Use(s) recorded among		
									Albanian	Macedonian	Gorani
Mentha longifolia (L.) Huds. (Lamiaceae) MSHMELO003	C; SC; W	APd	I: tea	To strengthen immunity and "health" in general, especially for children and for respiratory problems (cold)	**	+	–	–	+	–	+
Mentha piperita L. (Lamiaceae) MSHMEPI095	C	L; Fr	I: tea	Digestive problems (gastritis and gastric ulcers), respiratory problems (cough)	***	–	+	–	+	–	+
Morus alba L. (Moraceae) MSHMOAL1811	C	Fr	I:tea, jam, "pyte"	To treat cough, headache, fever, and hypertension	***	+	-–	+	+	+	+
Morus nigra L. (Moraceae) MSHMONI1911	C	Fr L	I: tea, jam	To treat anemia, constipation, appetite stimulant	***	–	–	+	+	+	+
Ocimum basilicum L. (Lamiaceae) MSHOCBA465	C	L	I: tea E: to heal skin from fire	To strengthen immunity (especially during pregnancy)	***	–	+	–	+	+	+
Ononis spinosa L. (Fabaceae) MSHONSP215	W	Flr	I: tea	Abdominal pain (gastritis and gastric ulcers)	*	–	–	+	+	–	–
Origanum vulgare L. (Lamiaceae) MSHORVU475	W	APd	I: tea	Respiratory problems (especially cough and bronchitis) and to strengthen the appetite	***	–	–	–	+	–	+

Table 5.1 (continued)

Botanical taxon/ taxa, family and voucher specimen	Status	Used parts(s)	Preparation and administration	Local medical use(s)	Quotation frequency	Vulnerability of species	Pharmaceutical market	Local market	Use(s) recorded among		
									Albanian	Macedonian	Gorani
Parietaria officinalis L. (Urticaceae) MSHPAOF265	W	L	I: tea, infuse, syrup	Urinary tract problems and kidney inflammations	*	+	–	+	+	–	+
Pinus sylvestris L. (Pinaceae) MSHPISY225	C; SC; W	L	I: tea	Chronic bronchitis	*	–	–	–	+	–	–
Plantago lanceolata L. (Plantaginaceae) MSHPLLA235	W	APd	I: tea E: to heal skin from fire directly into the wound	I: Abdominal pain (stomach ache)	**	–	–	+	+	+	+
Plantago major L. (Plantaginaceae) MSHPLMA245	W	APd	I: tea E: to heal eczema directly into the wound	I:abdominal pain (stomach ache)	**	–	–	–	+	+	+
Poterium sanguisorba L. (Rosaceae) MSHPOSA255	W	L	I: tea	To improve appetite	*	–	–	–	+	–	–
Prunella vulgaris L. (Lamiaceae) MSHBRVU012	W	Fl	E: tea in gargles	Against viral infections	**	–	+	+	+	–	–
Rosa canina L. (Rosaceae) MSHROCA275	W	Fl; Fr	I: tea E: to heal wounds directly	Respiratory problems (cough, bronchitis, and cold)	***	–	–	+	+	–	+
Rubus ulmifolius Schott. (Rosaceae) MSHRUUL285	W	L; Fr	I: tea as a substitute for *Camellia sinensis* and to make syrup	Respiratory problems (especially cough and cold) and to strengthen appetite	***	–	–	+	+	–	+

Table 5.1 (continued)

Botanical taxon/ taxa, family and voucher specimen	Status	Used parts(s)	Preparation and administration	Local medical use(s)	Quotation frequency	Vulnerability of species	Pharmaceutical market	Local market	Use(s) recorded among		
									Albanian	Macedonian	Gorani
Sambucus nigra L. (Adoxaceae) MSHSANI295	W	Fl	I: tea mixed with chamomile	Respiratory problems (bronchitis and cold)	***	–	+	–	+	+	+
Saponaria officinalis L. (Caryophyllaceae) MSHSAOF305	SC; W	APd	I: tea	Respiratory problems (bronchitis, cough), digestive problems (gastritis), and urinary tract infections (cystitis)	***	–	–	+	+	–	+
Sideriti scardica Griseb. (Lamiaceae) MSHSISC315	C; W	APd	I: tea	Abdominal pain (stomachache) and against sore throat (viral infections)	***	+	+	+	+	+	–
Sisymbrium officinale (L.) Scop. (Brassicaceae) MSHSIOF325	W	S; L; Fr	I: tea, infusion	Respiratory system problems (mostly to protect from tuberculosis, cough and asthma)	**	–	–	–	+	–	–
Tanacetum vulgare L. (Asteraceae) MSHTAVU455	W	L	I: tea	To treat rheumatism	***	–	–	–	+	–	–
Taraxacum officinale F.H. Wigg. (Asteraceae) MSHTAOF415	W	L	I: tea	Cardiovascular problems (to regulate hypertension during pregnancy)	**	–	–	–	+	–	+
Thymus serpyllum L. (Lamiaceae) MSHTHLO505	W	L	I: tea	Respiratory system problems (fever, influenza, cold)	***	–	–	–	–	+	+

Table 5.1 (continued)

Botanical taxon/ taxa, family and voucher specimen	Status	Used parts(s)	Preparation and administration	Local medical use(s)	Quotation frequency	Vulnerability of species	Pharmaceutical market	Local market	Use(s) recorded among		
									Albanian	Macedonian	Gorani
Thymus striatus Vahl (Lamiaceae) MSHTHST525	W	L	I: tea	I: dermatological system problems (to minimize the effect of edemas, to remove fluid)	**	–	+	+	–	–	+
Tilia cordata Mill. (Malvaceae) MSHTICO335	C; SC; W	Fl	I: tea	Sleeping difficulties (insomnia), abdominal pain (stomachache), respiratory problems (cough, fever)	***	–	–	+	+	+	+
Trifolium spp. (Fabaceae) MSHTRSP425	W	APf	I: tea E: to stop bleeding	Cardiovascular problems (troubles related to the blood pressure)	*	–	–	–	+	–	–
Tussilago farfara L. (Asteraceae) MSHTUFA345	W	L	I: tea	Disambiguation (ulcers), and cardiovascular problems (to treat open veins)	***	+	–	–	+	+	–
Urtica dioica L. (Urticaceae) MSHURDI355	W	APf; APd	I: tea E: to irritate skin	To improve schedule of the blood and to help people with diabetes	***	–	–	–	+	–	+
Vaccinium myrtillus L. (Ericaceae) MSHVAMY365	W	Fr; L	I: tea, syrup, tonic	Against viral infection as gargles (throat wash), cardio-vascular problems (to regulate schedule of the blood), abdominal pain (stomachache), against diarrhea	***	+	+	+	+	+	+

Table 5.1 (continued)

Botanical taxon/ taxa, family and voucher specimen	Status	Used parts(s)	Preparation and administration	Local medical use(s)	Quotation frequency	Vulnerability of species	Pharmaceutical market	Local market	Use(s) recorded among		
									Albanian	Macedonian	Gorani
Vaccinium uliginosum L. (Ericaceae) MSHVAUL565	W	Fr; L	I: tea, syrup, tonic	Abdominal pain (stomachache), food poisoning (diarrhea), cardiovascular problems (to regulate the blood)	***	–	+	+	+	–	+
Verbascum phlomoides L. (Scrophulariaceae) MSHVEPH385	W	Fl	I: tea	Respiratory system problems (chronic bronchitis, asthma, to prevent from tuberculosis, influenza, cold, fever)	***	–	+	+	+	+	–
Verbena officinalis L. (Verbenaceae) MSHVEOF395	W	Fl; L	I: tea	Nervous system (mental problems, against depression), sleeping difficulties, (insomnia), neurological disorder (migraine, headache), respiratory system problems (fever, cold), and to regulate temperature	*	–	–	–	+	–	+

[a] With kind permission from Springer Science+Business Media: Genetic Resources and Crop Evaluation: Traditional medicinal plant knowledge among Albanians, Macedonians, and Gorani in the Sharr Mountains (Republic of Macedonia), 60(7), 2013, Rexhepi et al.

+:yes;-:no; *quoted by less than 10% informants;**quoted by more than 10% and less than 40% informants;

*** quoted by more than 40% informants

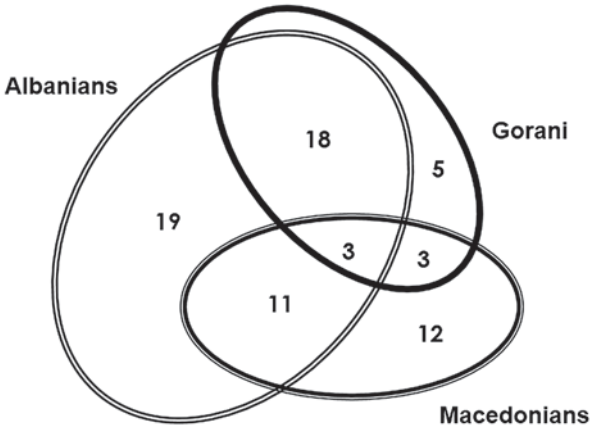

Fig. 5.3 Comparison among the medicinal plants recorded and used by the three ethnic groups

while a significant portion of plants quoted by Orthodox Macedonians showed an idiosyncratic use. This may be explained by the fact that the Gorani lived very close to the Albanian communities (check trapezoid symbol Nos. 21 and 22 in Fig. 5.2) in the study area over the last century, with marriages between the two communities being commonplace and facilitated by their shared (Muslim) faith.

5.3.3 Comparison with Other Balkan Ethnobotanies

The medicinal taxa that have also been recorded for the same or similar uses in ethnobotanical studies conducted in other surrounding Balkan areas are reported in Fig. 5.4. More than half of the medicinal plants reported in the current study have been recorded for similar uses in Bosnia and Herzegovina, while remarkable commonalities could also be found in Kosovo, Serbia, and Montenegro. Less than 10% of the medicinal plant reports agree with those found in northern Albania. This picture is similar to what has also recently been found in the Kosovar Alps (Mustafa et al. 2012b), and it underlines the importance of the historical role played by the former Yugoslavia in the last century in "homogenizing" cultural practices of plant use among different ethnic groups. This can be easily understood by tracing the folk heritage in the field of medicine and cuisine within the domestic arena, which was and is managed by women. During the last decades (and especially at the Yugoslavian times), intermarriages between Muslim Slavs (such as Bosniaks, Gorani, and Torbeshi) and Albanians of Muslim faith were quite common, thus resulting in regular exchange of the domestic folk practices managed by the women. This demonstrates that in the Balkans, religious heritage may have played a more crucial role in maintaining or changing folk medical practices within the original communities than linguistic differences. Similarly, a recent study among Orthodox Serbians

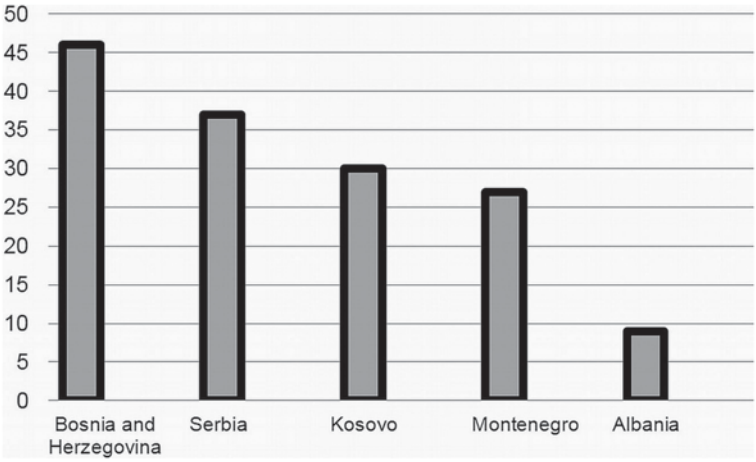

Fig. 5.4 Proportion (in %) of the recorded medicinal plants in the current study, which have also been recorded in recent ethnobotanical surveys conducted in surrounding countries

and Muslim "Bosniakised" Albanians in the Pester Plateau in Serbia would seem to confirm the same phenomenon (Pieroni et al. 2011). Future studies will have to make a more in-depth assessment of this issue, perhaps considering communities that have lived at historical, religious, and ethnic interfaces in the Balkans (i.e., Muslim Slavs in Albania or Catholic Albanians in the former Yugoslavia).

5.3.4 Conservation Concerns

The recent overexploitation of local plants for making home-made teas, many of which are often traded to local city markets, may raise serious concerns in a few cases. For example, the endemic species *Sideritis scardica* Griseb. can be found today growing only in the peak of "Ljuboten"—also known in old maps of Ptolomeus as "Monte Argentaro Vulgo Igliuboten." Locals also hold the perception that the ecological availability of *Gentiana lutea* L., *Hypericum perforatum* L., and *Thymus serpyllum* L. has also remarkably decreased over the last decades. Furthermore, a significant portion of the study participants (28%) claimed that medicinal species are under threat, mainly due to the uncontrolled collection devoted to both the local and external (pharmaceutical) markets.

Our observations that only the elder members of these communities are able to identify and use medicinal plants also confirms a negative impact of migration and erosion of TEK. Moreover, the transmission of TEK to younger generations does not appear to be commonplace. Thus, TEK concerning plants may be crucial for serious attempts to implement bioconservation initiatives and environmental education frameworks.

5.4 Conclusion

The traditional knowledge recorded in the Sharr Mountains shows the survival of an impressive intangible cultural heritage of TEK related to medicinal and food uses of the local flora. This ethnobotanical data provides an interesting basis for diverse applications, both in community-based bioconservation strategies, and also for further fostering a sustainable small-scale local trade of herbal teas. The cross-cultural comparison of three ethnic groups in this study revealed that the Muslim, Gorani, and Albanian communities share more plant uses in common than with the Orthodox Macedonians. Moreover, comparison with other Western Balkan medicinal plant folk knowledge systems demonstrated that nearly half of the medicinal plants recorded in the study area also share similar uses in Bosnia and Herzegovina and, to a lesser extent, in other former Yugoslavian territories, while the overlap with the ethnobotanies of mountainous areas in Albania is relatively moderate.

With regard to threats to the genetic resources of the Sharr Mountains, some concerns may arise regarding the danger of a potential overexploitation of a few taxa collected for sale on regional trade networks. The sustainable and effective management of wild medicinal plants should be considered as a priority for local rural development agendas, but this has to be addressed always starting from a deep comprehension of the local peoples' perception and habits regarding the plant collection and use.

Traditional management of medicinal plants has been considered by the local communities for a long time as part of the broader management of *common goods*. These communal forms of understanding limitation and benefits arising from renewable natural resources have represented the key issue for fostering resilience and socio-ecological sustainability. Programs aimed at supporting rural development projects will have to therefore seriously consider this aspect. The preservation and especially the "re-activation" of TEK concerning local natural resources should become a focus of highest priority in bioconservation-centered initiatives in this area, as migration trends towards urban centers and abroad by the young and mid-aged members of the population that are contributing to a decline of transmission of TEK regarding plants and ultimately to an impoverished understanding of the dynamic human–plant relations of this region.

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References

Aylangan P (2011) Tea in Turkey. http://www.teainturkey.com/Home_Page.html. Accessed 24 Dec 2013

de Boer H (2010) Local awareness of scarcity and endangerment of medicinal plants in Roussenski Lom Natural Park in Northern Bulgaria. In: Pardo-de-Santayana M, Pieroni A, Puri R (eds) Ethnobotany in the new Europe: people, health and wild plant resources. Berghahn, New York, pp 93–111

ISE (International Society of Ethnobiology) (2006) International Society of Ethnobiology Code of Ethics (with 2008 additions). http://ethnobiology.net/what-we-do/core-programs/ise-ethics-program/code-of-ethics/code-in-english/. Accesssed 24 Dec 2013

Jarić S, Popović Z, Mačukanović-Jocić M, Djurdjević L, Mijatović M, Karadžić B, Mitrović M, Pavlović P (2007) An ethnobotanical study on the usage of wild medicinal herbs from Kopaonik Mountain (Central Serbia). J Ethnopharmacol 111:160–175

Karadelev M (2001) Fungi Macedonici—Gabite na Makedonija. Makedonsko mikolosko drustvo, Skopje

Menković N, Šavikin K, Tasić S, Zdunić G, Stešević D, Milosavljević S, Vincek D (2011) Ethnobotanical study on traditional uses of wild medicinal plants in Prokletije Mountains (Montenegro). J Ethnopharmacol 133:97–107

Micevski K (1985–2005) Flora of the Republic of Macedonia. Skopje, Macedonian Academy of Science and Arts

Mustafa B, Hajdari A, Pajazita Q, Syla B, Quave CL, Pieroni A (2011) An ethnobotanical survey of the Gollak region, Kosovo. Genet Resour Crop Evol 59:1–16

Mustafa B, Hajdari A, Krasniqi F, Hoxha E, Ademi H, Quave CL, Pieroni A (2012) Medical ethnobotany of the Albanian Alps in Kosovo. J Ethnobiol Ethnomed 8:6

Nedelcheva A, Dogan Y (2009) Folk botanical nomenclature and classification in Bulgarian traditional knowledge. In: Morel JP, Mercuri AM (eds) Plants and culture: seeds of the cultural heritage of Europe. Edipuglia, Bari, pp 169–173

Nedelcheva A, Dogan Y (2011) Usage of plants for weather and climate forecasting in Bulgarian folk traditions. Indian J Tradit Knowl 10:91–95

Pieroni A (2008) Local plant resources in the ethnobotany of Theth, a village in the Northern Albanian Alps. Genet Resour Crop Evol 55:1197–1214

Pieroni A (2010) People and plants in Lëpushë. Traditional medicine, local foods, and post-communism in a North Albanian village. In: Pardo-de-Santayana M, Pieroni A, Puri R (eds) Ethnobotany in the new Europe: people, health and wild plant resources. Berghahn, New York, pp 16–50

Pieroni A, Giusti ME, Quave CL (2011) Cross-cultural ethnobiology in the western Balkans: medical ethnobotany and ethnozoology among Albanians and Serbs in the Pešter Plateau, Sandžak, South-western Serbia. Hum Ecol 39:333–349

Redzic S (2007) The ecological aspect of ethnobotany and ethnopharmacology of population in Bosnia and Herzegovina. Coll Antropol 31(3):869–890

Redzic S (2010) Wild medicinal plants and their usage in traditional human therapy (Southern Bosnia and Herzegovina, W. Balkan). J Med Plant Res 4:1003–1027

Rexhepi B, Mustafa B, Hajdari A, Rushidi-Rexhepi J, Quave CL, Pieroni A (2013) Traditional medicinal plant knowledge among Albanians, Macedonians and Gorani in the Sharr Mountains (Republic of Macedonia). Genet Resour Crop Evol 60:2055–2080

Šarić-Kundalić B, Dobeš C, Klatte-Asselmeyer V, Saukel J (2010) Ethnobotanical study on medicinal use of wild and cultivated plants in middle, south and west Bosnia and Herzegovina. J Ethnopharmacol 131:33–55

Šarić-Kundalić B, Dobeš C, Klatte-Asselmeyer V, Saukel J (2011) Ethnobotanical survey of traditionally used plants in human therapy of east, north and north-east Bosnia and Herzegovina. J Ethnopharmacol 133:1051–1076

UNEP (2010) Feasibility study on establishing a transboundary protected area Sharr/Šar Planina-Korab-Dešat/Deshat. UNEP, Vienna. http://www.envsec.org/publications/Feasibility%20study%20on%20establishing%20a%20transboundary%20protected%20area.%20Sharr-Sar%20Planina-Korab-Desat-Deshat.pdf. Accessed 24 Dec 2013

Chapter 6
An Ethnobotanical and Ethnomedicinal Study on the Use of Wild Medicinal Plants in Rural Areas of Serbia

Snežana Jarić, Miroslava Mitrović and Pavle Pavlović

6.1 Introduction

People have been using resources of plant, animal, and mineral origin with the aim of maintaining or improving the quality of life since time immemorial. A large number of plants were used as food and medicine in almost every ancient civilization: Egyptian, Chinese, Greek, and Roman (Heinrich et al. 2005). Traditional Chinese medicine relies on approximately 5000 species, with over 1500 used in Germany and 500 in South Africa. In Serbia, ethnomedicine today recognizes approximately 700 species, 420 of which are officially registered and around 270 are grown, gathered, sold, and used commercially (Hoareau and Da Silva 1999; Stevanović et al. 1995; Kišgeci and Sekulović 2000).

The scientific reasons behind specific plants being used successfully for specific illnesses were discovered as time passed and, hence, their use gradually became based more and more on explicable facts and less and less on empiricism (Parojčić and Stupar 2003). The therapeutic value of medicinal plants is based on the link which exists between the chemical structure of the active substances they contain and their pharmacodynamic effects on the body. The chemical nature of the pharmacologically active compounds varies, and they have a wide spectrum of properties (sedative, spasmolytic, antibiotic, astringent, anti-inflammatory, laxative, diuretic, digestive, analgesic, etc.). Hence, medicinal plants can be used by humans as a prophylaxis or for therapy for virtually any type of illness (Jarić et al. 2007, 2011). The complexity of the chemical composition of plants, which have from two to three identified elements, even up to 30–40 for some species, can explain the therapeutic effects one plant has on different illnesses (Miler 2009; Djurdjević et al. 2013). Medicinal plants are a cheap alternative when it comes to daily health care and self-medication, and are relied upon as home remedies for health problems, especially in less wealthy rural areas or in times of economic crisis (Leonti 2011).

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Likewise, medicinal plants and herbs have been used for many years in the treatment of various diseases in animals because the majority of them do not have a residual effect. These are used in animal feed as antibacterials, antioxidants, anticarcinogenics, antifungals, analgesics, insecticidals, anticoccidials, and growth promoters (Runjaić-Antić and Milinković 1990; Gruenwald et al. 2004).

Besides the characterization of environmental factors that affect the existence and distribution of natural resources, knowledge of traditional habits, and of the ethnobotanical and general ethnographic characteristics of a particular area, all serve as a professional ground for prospecting for those wild genetic resources that can be of use in the diet and/or medicine of local inhabitants (Bremner et al. 2004; Heinrich et al. 2005). The existence of traditional medicine basically depends on plant species diversity and the related knowledge of their use as herbal drugs. Between 50,000 and 70,000 plant species are known to be used in traditional and modern medicine systems throughout the world (Leaman 2006). Relatively few medicinal and aromatic plant species are cultivated. Thus, the great majority of these materials are provided by collection from wild resources (Lange and Schippmann 1997). In many countries, the excessive collection of wild plants was often combined with a loss of habitat resulting in a severe decrease in certain plant species. A similar situation has arisen in Serbia, whose wealth of medicinal flora makes exploitation possible, but at the same time imposes the need for its conservation.

This study examines ethnobotanical and ethnomedicinal research into those wild medicinal plants which are quantitatively most common and qualitatively most often used in the rural areas of Serbia. The most important aspects of their pharmacological effects are considered and also the spectrum of illnesses for which they are most often used in the treatment of people and animals. The ways in which the different plant parts are used both internally and externally are described, along with the ways they are prepared, the forms in which they are used (teas, decoction, tinctures, syrups, oil, ointment), and the required dosages. In addition, medicinal flora as a natural resource in rural areas are considered through the concept of the sustainable use of plants, which implies their rational exploitation, through which their survival and species longevity are made possible, ensuring future generations can use them at least to the same degree.

6.2 A History of the Use of Medicinal Plants in Serbia

With their arrival in the Balkans, the Slavs brought their traditions and beliefs and through blending with the native Balkan cultures created a Serbian culture in which healing with plants remained the only method of treating humans and animals for centuries (Kišgeci and Sekulović 2000). Their use by the Serbian people as a therapeutic or prophylactic has a long and rich tradition, as confirmed by numerous old manuscripts. The Hodosh Codex (fourteenth century), considered to be the oldest codex on Serbian secular medicine, quotes various uses of native and foreign herbal drugs: caraway, aloe, thyme, flaxseed and beet seed, root of the fig, coriander,

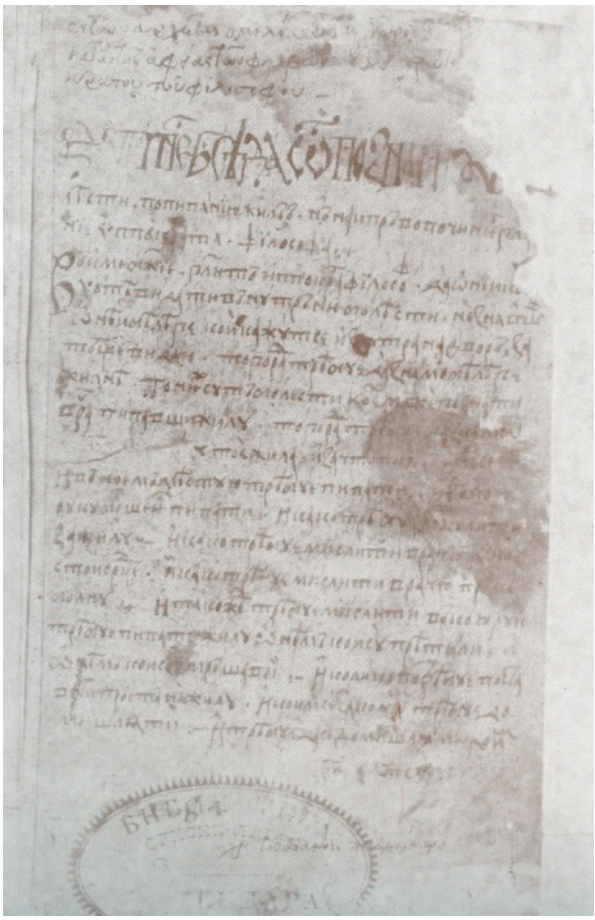

Fig. 6.1 The Chilandar Medical Codex, the antecedent to Serbian ethnobotany and ethnomedicine, cover page

beetroot juice, willow bark and leaves, and other plants that are still used in ethnomedicine today (Tucakov 1997). The Chilandar Medical Codex, No. 517 (fifteenth or sixteenth century) is the most significant collection on medieval Serbian medicine and the antecedent to Serbian botany (Fig. 6.1). Its contents suggest sound knowledge on the diversity of plant species, their origins, the level of their healing powers, how they should be gathered and prepared, and the recommended doses (Katić 1980; Jarić et al. 2011).

In the eighteenth, nineteenth, and twentieth centuries, many scientists contributed to preserving and sharing knowledge on healing, the characteristics of medicinal plants, how to use them and their dosages. In his *Big Serbian Herbarium* (1783), Zaharije Orfelin detailed approximately 500 plant species, and in his book *The Experienced Winemaker* (1808), he described several hundred recipes for making herbal wines and other potions and medicines. He also included recommendations on how and when to harvest and how to dry medicinal herbs, and on the usefulness and medicinal value of complex preparations made from over 200 native and

exotic plants which have true enological, pharmacognostic, and therapeutic value. In his *Serbian Dictionary* (1818), Vuk Stefanović Karadžić described the Serbian tradition of using medicinal herbs, while the most famous Serbian physicists and botanists, Josif Pančić (in his book *Botany,* 1868; 1873) and Sava Petrović, gave a lot of information on the diversity and use of medicinal plants in their capital book *The Medicinal Plants of Serbia* (1883). In his book *Popular Medicine Among the Serbs* (1872), Vladan Đorđević described the state of public health in Serbia, forms of treatment, the attitude to medicines, their composition, and their use. Additionally, a significant contribution to the study and use of medicinal plants in traditional phytotherapy was made by Vasa Pelagić (*The National Teacher,* 1879) and Rista Gostuški (*Healing with the Medicinal Plants of Yugoslavia,* 1935). However, the greatest contribution to expanding knowledge in the area of recognizing the medicinal properties of plants and their uses for treating people in the twentieth century was undoubtedly made by Jovan Tucakov (1905–1978), who described the pharmacological effects and uses of over 500 plant species.

6.2.1 Serbia: An Important Center of Medicinal Plant Diversity

The Balkan Peninsula, including parts of Serbia, is one of the 25 biodiversity "hot spots" or centers of biodiversity. Serbia, as part of the Balkan Peninsula, is characterized by exceptional diversity in its vegetation and flora, and for this reason it is classified as one of the 158 world centers of biodiversity. The greatest wealth and diversity of plants are found in the high-altitude regions of Serbia (Prokletije, Šara, Stara Mountain, Suva Mountain, Rtanj, Kopaonik, Tara, and Zlatibor), in numerous canyons, gorges, and mountain peaks, as well as in the remnants of former steppes and sandy terrain (Deliblato Sands and Subotica-Horgoš Sands), and saline soils and wetlands in the north of Serbia.

The particular nature of the ecology of the different regions of Serbia has led to the development of specific genetic potential for the production of the active components of certain plant species. On the basis of this, these regions can be considered a center of diversity of medicinal flora, which grows in different ecosystems and on different geological and pedological substrates. The diversity of the medicinal plants in the Republic of Serbia comprises around 700 species (10.7% of the total flora of Serbia (3562 taxa)), and they inhabit a whole variety of habitats, from wetland to high-altitude mountain habitats (Sarić 1989; Fig. 6.2). These medicinal and aromatic species are for the most part elements of meadow phytocoenoses (approximately 300), while there are considerably fewer in oak (123) and beech forest phytocoenoses (122) (Dajić et al. 2000). The majority of the medicinal species are from the angiosperm division (Magnoliophyta) and are categorized into 89 families, of which the following contain the most species: Lamiaceae (41), Asteraceae (40), Apiaceae (20), Ranunculaceae (19), Scrophulariaceae (17), Malvaceae (15), Rosaceae (15), Brassicaceae, and Polygonaceae (10) (Dajić Stevanović and Ilić 2005). Some medicinal plants are overused (*Adonis vernalis* L., *Arctostaphylos uva-ursi* (L.) Spreng, and *Gentiana lutea* L.), and hence today they find themselves on the

Fig. 6.2 A map of Serbia showing the mountain regions where plants are most frequently used in ethnomedicine

list of endangered species or their habitats have been anthropogenically disturbed, which has also threatened their survival. Those that are particularly at risk are relict species like *Picea omorika* (Pančić) Purk., whose young shoot tips are most often used in western Serbia for treating wounds, coughs, lung complaints, and rheumatism. Endemic species are also under threat, like, e.g., *Satureja kitaibelii* Wierzb. ex Heuff. (endemic to Rtanj Mountain), which is widely used in ethnomedicine

in eastern Serbia, or the stenoendemic species of the flora of Ošljak (the northern slopes of Šara Mountain) *Achillea alexandri-regis* Bornm. & Rudsky, which is increasingly the focus of pharmacologists' attention because of its medicinal properties (Stevanović et al. 1995).

6.2.2 The Use of Medicinal Plants in Serbia Today

The role and importance of medicinal plants in Serbian ethnomedicine is best illustrated by the diversity of their uses (Tables 6.1 and 6.2). All possible manner of plant parts are used either in their fresh or dried state: roots, rhizomes, tubers, bulbs, bark, stems, leaves, young branches, buds, flowers, fruit, seeds, the whole plant, or its aerial part. The way the plant is prepared and applied as a medicine depends on the type of ailment, but most frequently it is used in the form of tea, decoction, tincture, syrup, oil, or ointment, or some plant organs (the whole leaf, chopped bark, or flower) are applied directly to the wound, cut, boil, etc.

In this study, we present the 80 medicinal herbs that are most frequently used for treating people in the rural areas of Serbia, as shown by previous research (Tucakov 1978; Milojević 1988; Mihajlov 1988, 1996; Gajić et al. 1992; Ranđelović et al. 2005; Jarić et al. 2007) and also by our latest findings (Table 6.1). The plants described are classified into 39 families, of which the following contain the most species: Lamiaceae (16.2%), Asteraceae (13.7%), and Rosaceae (12.5%). Their healing properties and aroma are the result of the high content of ethereal oils, for which reason some of these plants are often cultivated (Tucakov 1978).

An analysis of the way the most frequently used plants are administered shows that internal use is the most common (50%), then internal and external (41.2%), while 8.7% are only applied externally. The spectrum of ailments and problems for which they are used is diverse, which highlights a sound familiarity with the species and also with the ailments and problems for which they are used. Out of the 80 medicinal plants selected, the majority were used for treating diseases of the digestive system (37), skin conditions (21), respiratory tract diseases (21), urogenital problems (14), nervous tension (17), diseases of the heart and blood vessels (8), and gynecological problems (8). The external application of medicinal plants is mostly in the treatment of rheumatic diseases, arthritis, injuries, wounds, hemorrhoids, and also numerous skin complaints. Tea is the most widespread method of using some plants, but brandy has a major role to play in Serbian ethnomedicine, too. *Prepečenica* (double-distilled brandy) is most often used, produced by re-distilling weak brandy and typically over 40% ABV, and *komovica* made from grape pomace (Drobnjak 2004). Special kinds of brandy are also made for healing purposes, so-called *travarica* (herbal brandy), brandy mixed with medicinal herbs (wormwood, gentian, juniper, walnut, etc.). The way these brandies are made is similar, but the way they are used is diverse: healing digestive problems, improving appetite, treating arthritis, rheumatism, and thyroid conditions, as an antipyretic, a disinfectant, an anesthetic for toothache, for treating wounds, contusions and fractures, etc. Brandy is a form of first aid for the majority of health problems, and every household has some.

Table 6.1 The most frequently used medicinal herbs in Serbian ethnomedicine

Botanical taxon (Family)	English name (Serbian name)	Part used[a]	Properties, medicinal use, and preparation[b]	Other purposes
Achillea millefolium L. (Asteraceae)	Yarrow (Hajdučka trava)	AP	*I*: Aromatic, stomachic, digestive, antitussive, anti-asthmatic (tea—equal quantities of yarrow leaf, coltsfoot, lemon balm, and mallow flowers); preventing tuberculosis and improving appetite (tea before a meal); tonic (syrup); gynecological problems (tea: leaves of yarrow, common centaury, blackberry, shepherd's-purse, nettle, and agrimony and marigold flowers); diuretic, hypotensive (tea: yarrow, flowers of hawthorn, and wild chamomile); preventing prostrate conditions (tea). *E*: Astringent—the ground dried plant is put directly onto wounds, ulcers, and hemorrhoids; as a compress for cuts and burns (oil: oil is poured over fresh flowers and then left in the sun for 40 days). The same applies to *A. clypeolata*	
Agrimonia eupatoria L. (Rosaceae)	Agrimony (Ranjenik)	AP; L	*I*: Antitussive, pain relief, treating nervous tension, dysentery, and bloody diarrhea (tea) *E*: For wounds, cuts, and edema (the leaf is placed directly on the wound under a bandage), for sore throats (mouth wash with tea)	Disinfectant: Boiling hot water is poured over the whole plant and the steam is used to disinfect special containers, which are then used for cheese making (eastern Serbia)
Alchemilla vulgaris L. (Rosaceae)	Lady's mantle (Virak)	L; YAP	*I*: Astringent, antihemorrhagic, tonic, cardiotonic, diuretic; treating increased secretion, menstrual pains, oligomenorrhea, preventing anemia, helping and easing the birthing process, easing problems caused by menopause and puberty (tea)	
Allium ursinum L. (Amaryllidaceae)	Ramsons (Sremuš)	L	*I*: Lowering blood pressure and cholesterol (it is eaten or the leaves are soaked in alcohol and this is drunk, ten drops in a small glass of water, before meals)	Culinary (salad)
Althaea officinalis L. (Malvaceae)	Marshmallow (Beli slez)	R; L	*I*: Antitussive, a mucilaginous herb that soothes and softens tissues, expectorant; for bronchitis, asthma, whooping cough (the chopped root is kept in cold water for 2 h to extract mucus); for urinary tract infections (tea, leaf)	

Table 6.1 (continued)

Botanical taxon (Family)	English name (Serbian name)	Part used[a]	Properties, medicinal use, and preparation[b]	Other purposes
Angelica sylvestris L. (Apiaceae)	Wild angelica (Angelika)	WP	*I*: Improving appetite, detoxification, carminative, spasmolytic, uroseptic, expectorant, for sore throats (tea)	
Arctostaphylos uva-ursi (L.) Spreng. (Ericaceae)	Bearberry (Uva)	L	*I*: Uroantiseptic, diuretic; treating an enlarged prostate, the urinary organs (kidney sand and stones), cystitis, diarrhea, and diabetes (tea)	
Artemisia absinthium L. (Asteraceae)	Absinthe wormwood (Beli pelin)	AP	*I*: Amaro aromatic, improving appetite, stomachic, choleretic (tea; "pelinkovac" —a small glass before breakfast *E*: Rinsing infected wounds ("pelinkovac"—the fresh herb is put in a bottle, covered with brandy and left to stand for 9 days); relieving stomach aches in children (the finely chopped herb is placed on the stomach under a bandage)	
Artemisia vulgaris L. (Asteraceae)	Mugwort (Pelin)	AP	*I*: Digestive, stimulant, diuretic, tonic, improving appetite (tea, "pelinkovac"), for dyspepsia (tea), stomach problems ("pelinkovac")	
Asarum europaeum L. (Aristolochiaceae)	European wild ginger (Kopitnjak)	L; R	*I*: For kidney problems (tea or one leaf is eaten daily); for hemorrhoids (the diced root is air-dried for at least 5 days; one cube is eaten with food every day for 30 days)	
Betula pendula Roth. (Betulaceae)	Silver birch (Breza)	L; Bu	*I*: Dissolving kidney stones (tea), diuretic (tea, decoction)	Decorative; apotropaion
Calendula officinalis L. (Asteraceae) cultivated	Marigold (Neven)	F	*I*: Vermifuge, tonic, improving appetite (tea) *E*: For skin diseases; treating fungal feet infections, wounds, and bruises (ointment); treating burns and frostbite. For swelling of the leg and painful veins (ointment is prepared with 0.5 kg of pure fat heated to boiling point; then two handfuls of marigold flowers are added and covered for 24 h; the next day, the whole preparation should be heated, filtered through a cloth, and put into glass flasks)	

Table 6.1 (continued)

Botanical taxon (Family)	English name (Serbian name)	Part used[a]	Properties, medicinal use, and preparation[b]	Other purposes
Capsella bursa-pastoris L. (Brassicaceae)	Shepherd's purse (Hoću-neću)	AP	*E*: Astringent, antiseptic, hemostatic—for surface wounds (the dried, ground plant is applied directly to the wound)	
Castanea sativa Mill. (Fagaceae)	Sweet chestnut (Pitomi kesten)	Fr	*E*: For swelling of the leg and painful veins (the chopped fruit is kept in plum brandy for 40 days before being filtered; the solution is then rubbed on the legs). The same applies to the cultivated *Aesculus hippocastanum* L.	Culinary
Centaurium umbellatum Gilib. (Gentianaceae)	Common cantaury (Kičica)	AP	*I*: Tonic for the digestive system; for dyspepsia, hepatitis; bitter aromatic, improving appetite (regulating wind, bloating) (tea: equal quantities of common centaury, mint, chamomile and lemon balm); antidiabetic, antipyretic, soothing sore throats, treating stomach ulcers (tea), lowering cholesterol (tea —equal amounts of common centaury, juniper, prickly juniper, mint and primrose) *E*: Analgesic (spinal pain) (compress—common centaury is added to grape pomace brandy higher than grade 21 (i.e., over 50% ABV) and then left to stand for 2 weeks)	
Chelidonium majus L. (Papaveraceae)	Tetterwort (Rusa)	AP	*I*: Antiphlogistic, cholagogue, antispasmodic, diuretic, laxative; treating cholecystitis, jaundice, hepatitis, gout, cytostatic for tumors, for changes to the female sex organs (tea) *E*: For skin complaints: lichen planus, skin eruptions, psoriasis, eczema, warts, corns (juice applied directly to skin)	
Cichorium intybus L. (Asteraceae)	Chicory (Cikorija)	R	*I*: Diuretic, digestive and improving appetite (decoction), laxative properties that reduce inflammation, antidiabetic, antidiarrheal, liver complaints (tea)	Coffee substitute: Chicory root is mixed with acorns (fruit of the oak), roasted and ground
Cornus mas L. (Cornaceae)	Cornelian cherry (Dren)	Fr	*I*: Antidiarrheal, astringent, and laxative (eat the fruit)	Culinary (preserves, juice); apotropaion

Table 6.1 (continued)

Botanical taxon (Family)	English name (Serbian name)	Part used[a]	Properties, medicinal use, and preparation[b]	Other purposes
Corylus avellana L. (Betulaceae)	Hazel (Leska)	L	*I*: For diarrhea and menorrhagia (strong tea) *E*: Astringent for hemorrhoids (tea: equal quantities of hazel, yarrow, wall germander, toadflax, common centaury, wild strawberry, plantain, butcher's broom, danewort, peppermint, stinging nettle, and dandelion —as a compress)	Culinary; apotropaion
Crataegus oxyacantha L. (Rosaceae)	Hawthorn (Glog)	F	*I*: Cardiotonic, circulatory stimulant, antihypertensive, regulating coronary blood flow, treating arrhythmia, and arteriosclerosis, (tea: equal quantities of hawthorn flowers, garlic, horsetail, and mistletoe) The same applies to *Crataegus monogyna* Jacq.	Roasted seeds as a coffee substitute; apotropaion
Epilobium parviflorum With. (Onagraceae)	Small flowered hairy willow herb (Sitnocvetna mlečika)	AP	*I*: For urinary and genital ailments: prostatitis, cystitis, urethritis, kidneys (tea) The same applies to *Epilobium hrsutum* L.	
Equisetum arvense L. (Equisetaceae)	Horsetail (Rastavić)	AP	*I*: Diuretic, urinary antiseptic, preventing an inflamed urinary tract, easing the passing of urinary and kidney sand and renal problems (tea)	
Foeniculum vulgare L. (Apiaceae) cultivated	Fennel (Morač)	Fr; S	*I*: Carminative, purgative, improving appetite, spasmolytic, relieving digestive problems (tea); mouthwash for gum disorders and a gargle for sore throats	Culinary herb
Fragaria vesca L. (Rosaceae)	Wild strawberry (Šumska jagoda)	L	*I*: Diuretic, laxative, antidiarrheal (tea). *E*: For hemorrhoids (the washed, clean leaf can be applied onto the sore area)	Culinary (preserves, juice, jam)
Galium verum L. (Rubiaceae)	Ladies' bedstraw (Ivanjsko cveće)	AP	*I*: Sedative for nervous irritability and insomnia, diuretic (tea) *E*: Astringent; for skin ailments, wounds, ulcers, and acne (tea); burns (unguent: freshly squeezed juice is well mixed with butter)	
Gentiana cruciata L. (Gentianaceae)	Star gentian (Prostreja)	AP	*I*: Analgesic, sedative (tea); sudden illness	

Table 6.1 (continued)

Botanical taxon (Family)	English name (Serbian name)	Part used[a]	Properties, medicinal use, and preparation[b]	Other purposes
Gentiana lutea L. (Gentianaceae)	Bitterwort (Lincura)	R	*I*: Digestive, easing stomach pains, improving appetite, raising bile secretion, strengthening the immune system, treating anaemia, and paleness (gentian brandy—slightly-built people drink one small glass, larger people two glasses per day, before a meal) *E*: For arthritis ("gentian"—10 g finely diced and dried of root is added to 1 l of plum brandy; the tightly shut bottle is left in a dark place for at least 3 weeks)	
Hedera helix L. (Araliaceae)	English Ivy (Bršljan)	L	*E*: On swollen tissue (tea; as a compress); treating ulcers and wounds (juice from the fresh leaf put directly onto the wound); decoction—for rubbing on areas affected by allergies	
Hypericum perforatum L. (Hypericaceae)	St John's wort (Kantarion)	AP	*I*: Stomachic, digestive, treating gastrointestinal ailments (stomach ulcers, liver, and bile ailments, jaundice), for moderate depression, insomnia, and dizziness (tea) *E*: Astringent, calming properties; for hemorrhoids (oil); creams and infused oils are applied to burns, wounds, cuts, muscular pain, sciatica, neuralgia (oil: olive oil or sunflower oil is poured over fresh flowering tops and left in the sun for 30–40 days to make a red oil). For a newborn infant's gastric spasms (by putting oil on the baby's abdomen and by dressing warmly)	
Hyssopus officinalis L. (Lamiaceae)	Hyssop (Izop)	AP	*I*: Treating chronic bronchitis and asthma, a stomachic (tea)	Culinary herb
Inula helenium L. (Asteraceae)	Elecampane (Crni oman)	R	*I*: Tonic, pungent, expectorant, antitussive; treating pulmonary diseases: bronchitis, coughs, hay fever, asthma, tuberculosis, and pleurisy (tea) *E*: Dandruff prevention and strengthening hair roots (tea), for massaging onto painful areas (the chopped root is mixed with brandy)	

Table 6.1 (continued)

Botanical taxon (Family)	English name (Serbian name)	Part used[a]	Properties, medicinal use, and preparation[b]	Other purposes
Juglans regia L. (Juglandaceae)	walnut (Orah)	L; B; Fr	*I*: Expectorant and laxative; digestive tonic and purgative (leaves; tea); antidiarrheal and antianemic (bark; tea), aphrodisiac (the fruits are mixed with honey and eaten), thyroid problems ("Walnut brandy": Make small cuts in 40 green (unripe) walnuts, cover with 2 l of "grape brandy," add sugar as necessary, and leave in the sun for 40 days; one glass of the strained mixture is drunk before breakfast) *E*: For cuts, grazes, and skin disorders such as eczema, herpes, infections and ulcers, (rinsing with tea), stomatitis (decoction), antirheumatic (tea made from the leaf as a compress); for washing hair	Culinary; dyeing wool; for rinsing out wine fermenting tanks and preventing moths; due to its fungicidal and bactericidal properties, walnut and smoketree tea is poured into the large wooden barrels, which are then hermetically sealed and left for some time for the liquid to take effect.
Juniperus communis L. (Cupressaceae)	Juniper (Kleka)	Fr	*I*: Antiseptic, diuretic, anti-inflammatory and digestive properties (for poor digestion with wind) (tea); treating pyelonephritis, urethritis, cystitis, for inhalation (tea) *E*: For rheumatic pain ("Juniper brandy": 15–20 ripe juniper berries are covered with 1 l of plum brandy and left in the sun for 40 days; a massage)	Culinary spice
Leonurus cardiaca L. (Lamiaceae)	Motherwort (Srdačica)	AP	*I*: Pulmonary complaints, anti-asthmatic, diseases related to the heart and blood vessels (tachycardia, arrhythmia), antihypertensive, menstrual problems, dysuria, diuretic, sedative, nerve tonic (tea)	
Malus sylvestris (L.) Müll. (Rosaceae)	Crab apple (Divlja jabuka)	Fr	*I*: Improving circulation and strengthening the constitution (vinegar: 2–3 spoonfuls of vinegar and 1 spoonful of honey dissolved in 200 mL of water and drunk)	Culinary, vinegar

Table 6.1 (continued)

Botanical taxon (Family)	English name (Serbian name)	Part used[a]	Properties, medicinal use, and preparation[b]	Other purposes
Malva sylvestris L. (Malvaceae)	Mallow (Crni slez)	AP; F; L; R	*I*: Pulmonary complaints (tea from the aerial parts), mucilaginous, expectorant, reducing inflammation, antitussive, for lung ailments, bronchitis, throat infections, asthma, and emphysema (often combined with marshmallow) (tea from the flowers) *E*: Rinsing wounds that will not heal, skin cancer (decoction [leaves] or as a compress); treating the thyroid, tumors in the throat and on the vocal chords (a mash is made with barley flour and then placed under a bandage); inducing abortion (root)	
Marrubium vulgare L. (Lamiaceae)	Horehound (Očajnica)	AP	*I*: Pulmonary conditions, expectorant, spasmolytic, antitussive, choleretic, cholagogue, sedative, treating female infertility (tea) *E*: Tonic for children (bath accompanied by a massage)	
Matricaria chamomilla L. (Asteraceae)	Chamomile (Kamilica)	AP	*I*: Spasmolytic and analgesic for stomach pains, digestive where dyspepsia is concerned, stomachic, purgative, carminative; used as a steam inhalation for sinusitis (tea) *E*: Antiseptic, anti-inflammatory with sedative properties—for skin and mucous complaints: burns, wounds, ulcers (compress), washing sex organs and sore spots; rinsing an oral cavity after a tooth has been extracted (tea); for washing hair, antidandruff	
Melissa officinalis L. (Lamiaceae)	Lemon balm (Matičnjak)	AP	*I*: Sedative, digestive properties; taken for nervous anxiety, depression, tension headaches, and indigestion (tea drunk after a meal); diseases related to the liver and gallbladder, jaundice, complaints related to the heart and blood vessels, (tea); tea blend for strengthening nerves: equal quantities of lemon balm, valerian, hops, hawthorn, wild thyme, and peppermint	For peaceful sleep—pillows are filled with the dried aerial parts (northern and western Serbia); to lure bees—beekeepers rub hives with this plant (eastern Serbia).
Mentha pulegium L. (Lamiaceae)	Pennyroyal (Divlja nana)	AP	*I*: Improving digestion, increasing perspiration, antiseptic, sedative, and carminative properties; for gastric ulcers, indigestion, abdominal pains, diarrhea, influenza, colds; spasmolytic (tea) The same applies to the cultivated *Mentha piperita* L.	Culinary herb

Table 6.1 (continued)

Botanical taxon (Family)	English name (Serbian name)	Part used[a]	Properties, medicinal use, and preparation[b]	Other purposes
Ocimum basilicum L. (Lamiaceae) cultivated	Basil (Bosiljak)	AP	*I*: Sedative (for peaceful sleep), analgesic and spasmolytic, preventing colds and influenza, for inhalation (tea)	Culinary herb; insecticide (mosquitoes are repelled by the smell); used in all religious rituals; apotropaion
Ononis spinosa L. (Fabaceae)	Restharrow (Zečiji trn)	R	*I*: Aiding relaxation, improving digestion, gastrointestinal ailments (tea); liver diseases (steatosis) (tea mixture—restharrow root, wild strawberry leaf, aerial part of mugwort, wall germander, couch grass and St John's wort, and leaf of the stinging nettle)	
Origanum vulgare L. (Lamiaceae)	Oregano (Vranilovka)	AP	*I*: For gastrointestinal ailments—minor digestive upsets, and insomnia, headaches, colds and bronchitis, antiseptic for the respiratory organs (tea)	Culinary herb
Physalis alkekengi L. (Solanaceae)	Chinese lantern (Ljoskavac)	Fr	*I*: For urinary ailments (kidney stones); strong diuretic properties (10–20 berries a day, over a 10-day period taken with honey or jam, before a meal)	
Pimpinella saxifraga L. (Apiaceae)	Greater burnet saxifrage (Bedrinac)	R	*I*: For bronchial asthma (tea: equal amounts of greater burnet and hawthorn); for mouth and throat infections (tea: a combination of equal amounts of greater burnet, yarrow, and chamomile)	
Pinus sylvestris L. (Pinaceae)	Scots pine (Beli bor)	B; N	*I*: For chronic bronchitis (syrup: 100 g of buds in 0.5 l of boiled water, strained after 2 h and mixed with 1 kg of honey— dose: four to five tablespoons a day); for scurvy (tea)	
Plantago lanceolata L. (Plantaginaceae)	Plantain (Bokvica)	L	*I*: For diarrhea, spasms, intestinal and stomach ulcers (tea) (leaf only or combined with mint). Antitussive and expectorant (tea: plantain leaf combined with flowers of the marshmallow, the flower and leaf of fennel and coltsfoot; plantain syrup mixed with honey and primrose, collects mucous, which is easily expunged) *E*: Antiseptic, disinfectant; poultice to be applied to wounds, cuts, festering wounds, and ulcers. The same applies to *Plantago major* L. and *Plantago media* L.	

Table 6.1 (continued)

Botanical taxon (Family)	English name (Serbian name)	Part used[a]	Properties, medicinal use, and preparation[b]	Other purposes
Polygonum bistorta L. (Polygonaceae)	Bistort (Srčenjak)	Rh	*I*: Antidiarrheal (tea) *E*: For skin complaints, festering wounds, and hemorrhoids (tea prepared and applied as a compress)	
Potentilla erecta (L.) Räusch. (Rosaceae)	Tormentil (Srčenica)	Rh	*I*: For diarrhea (tea) *E*: Rinsing wounds (tea)	
Primula veris L. (Primulaceae)	Primrose (Jagorčevina)	Rh	*I*: For bronchitis and coughs (taken as a syrup and tea)	
Pulmonaria officinalis L. (Boraginaceae)	Lungwort (Plućnjak)	AP	*I*: For catarrh, antitussive and expectorant, treating influenza, pneumonia, chronic bronchitis, and pulmonary tuberculosis; detoxifying the blood and a tonic (tea)	
Ranunculus ficaria L. (Ranunculaceae)	Celandine (Ledinjak)	T	*I*: For hemorrhoids (one tablespoon of finely chopped "root" in a wine glass with honey, three times a day before meals)	
Rosa canina L. (Rosaceae)	Dog Rose (Šipak)	Fr	*I*: Astringent and tonic; for colds and influenza (tea)	Culinary (jam)
Rubus fruticosus L. (Rosaceae)	Blackberry (Kupina)	L	*E*: For boils and festering wounds (compress)	Culinary (juice, preserve, jam, fresh fruit)
Rumex acetosa L. (Polygonaceae)	Sorrel (Zelje)	S	*I*: Astringent, diuretic with laxative effects; for diarrhea and anemia (tea)	Culinary (the leaf)
Salvia officinalis L. (Lamiaceae) cultivated	Sage (Žalfija)	AP	*I*: Astringent and diaphoretic (tea). *E*: Antiseptic; easing toothache and as a mouthwash	Culinary herb

Table 6.1 (continued)

Botanical taxon (Family)	English name (Serbian name)	Part used[a]	Properties, medicinal use, and preparation[b]	Other purposes
Salvia verticillata L. (Lamiaceae)	Meadow sage (Seruša)	L	*E*: Treating wounds, cuts, ulcers, festering wounds; hemostatic for wounds and injuries; antiphlogistic and antirheumatic (the leaf is smeared with fat and then placed under a bandage)	
Sambucus ebulus L. (Adoxaceae)	Danewort (Aptovina)	WP	*E*: Antirheumatic (tea as a bath soak and compress)	Brandy from the mature fruit
Sambucus nigra L. (Adoxaceae)	Elder (Zova)	F	*I*: Antitussive, expectorant, pungent, antipyretic, reducing inflammation, for colds, influenza and perspiration (tea), for whooping cough (tea—equal quantities of elder flowers, marshmallow, coltsfoot, and fennel); diuretic (tea)	Culinary (juice)
Sanguisorba minor Scop. (Rosaceae)	Salad burnet (Lubeničnjak)	AP	*I*: Antidiarrheal, stopping bleeding from the lungs and womb, treating dysentery (tea—equal quantities of betony, burnet, horsetail, shepherd's-purse, and lady's mantle, 1 spoonful 5–6 times a day) *E*: Antidote (to snake bites)	
Satureja kitaibelii Wierzb. et Heuff. (Lamiaceae)	Savory (Čubar)	AP	*I*: Improving appetite; stopping coughs; analgesic and reducing nervous tension (tea)	
Satureja montana L. (Lamiaceae)	Winter savory (Rtanjski čaj)	AP	*I*: Colds (tea)	
Sempervivum tectorum L. (Crassulaceae)	Houseleek (Čuvarkuća)	L	*I*: For stomach and intestinal ulcers (one leaf eaten a day) *E*: For earache (a compress made from juice applied to the sore area or the juice can be poured directly into the ear); the juice obtained from cutting the leaf longitudinally is applied to any area with Herpes zoster; for boils and corns (the leaf with the epidermis removed is placed under a bandage)	Apotropaion

Table 6.1 (continued)

Botanical taxon (Family)	English name (Serbian name)	Part used[a]	Properties, medicinal use, and preparation[b]	Other purposes
Solidago virgaurea L. (Asteraceae)	Golden rod (Zlatnica)	AP	*I*: For urinary disorders (renal lithiasis, pyelonephritis, chronic nephritis, cystitis), diarrhea, and depression (tea)	
Sorbus domestica L. (Rosaceae)	Rowan (Oskoruša)	B; Fr	*I*: Reducing cholesterol (tea made from the bark), balancing digestion (gastric and intestinal problems), antidiarrheal (the fruits are eaten after leaving them to stand for some time in hay or straw)	Culinary
Stachys officinalis (L.) Trev. (Lamiaceae)	Betony (Ranilist)	WP	*I*: Reducing high stomach acidity (tea); for bronchitis, coughs, asthma (tea) *E*: For skin complaints: wounds, burns (compress made of tea)	
Symphytum officinale L. (Boraginaceae)	Comfrey (Crni gavez)	R	*I*: Expectorant (tea) *E*: Compress (fresh ground root boiled to make a mush; it must be put onto linen and on broken bones previously immobilized by a splint)	
Tamus communis L. (Dioscoreaceae)	Black bryony (Bljušt)	Rh; Fr	*I*: For hematomas (the ground rhizome is mixed with honey and cooked. One to two teaspoons are taken in the morning, before breakfast) *E*: For rheumatism (tea or fresh fruits are rubbed onto the skin) and sciatica (rub sore areas with root; afterwards, sore areas become red and warm; apply oil or milk afterwards to prevent inflammation; or, apply a compress prepared from grated rhizome with or without plum brandy)	
Taraxacum officinale Weber (Asteraceae)	Dandelion (Maslačak)	AP	*I*: Tonic, for pulmonary ailments and stopping coughing (150 flowers boiled in 3 l water; sugar is added and the whole mixture is boiled until it thickens to the consistency of honey, 1 teaspoon to be taken before meals) *E*: Preventing spots and marks on the skin (the juice is applied directly to the skin)	Culinary (the fresh young leaves as a spring salad)

Table 6.1 (continued)

Botanical taxon (Family)	English name (Serbian name)	Part used[a]	Properties, medicinal use, and preparation[b]	Other purposes
Teucrium chamaedrys L. (Lamiaceae)	Wall germander (Podubica)	AP	*I*: For gastrointestinal ailments, improving digestion, febrifuge, antipyretic (tea) The same applies to *Teucrium montanum* L.	
Thymus serpyllum L. (Lamiaceae)	Wild thyme (Majčina dušica)	AP	*I*: For gastrointestinal and pulmonary ailments (tea); digestive, stomachic, antitussive, easing cold symptoms, for joint inflammation, easing breathing difficulties (tea) *E*: Joint inflammation (bath soak)	Culinary herb
Tilia cordata Müller (Tiliaceae)	Small-leaved linden (Lipa)	F	*I*: For perspiration, diarrhea, stomach spasms, insomnia and colds (tea). The same applies to *Tilia platyphyllos* Scop.	Apotropaion
Tussilago farfara L. (Asteraceae)	Coltsfoot (Podbel)	L	*E*: For festering wounds and ulcers; haemostatic for small cuts or wounds (the fresh leaf is placed under a bandage); for swollen lymph nodes (leaves are coated in oil and then placed under a bandage); for vein inflammation (kneaded fresh leaves mixed with fresh sour cream put onto skin and wrapped in linen cloth); in cosmetics for removing spots, treating leg wounds (massage with tincture)	
Urtica dioica L. (Urticaceae)	Stinging nettle (Kopriva)	WP	*I*: Astringent, diuretic, tonic herb that controls bleeding and slightly reduces blood pressure and blood sugar levels; for anemia, heavy menstrual bleeding, jaundice, stones in the urinary bladder, preventing dizziness (tea) *E*: For sciatica, neuralgia, and rheumatism (extract, fresh, cooked with salt and applied as a poultice to the sore area); older people sting themselves by massaging the whole body with the young nettle's aerial parts (during the spring and summer); for hair loss (approximately 100 g per two handfuls of leaves boiled for 20 min in half a liter of rainwater; afterwards, half a handful of wild chamomile added (25 g), and then left covered overnight; the following morning 200 g of vinegar added to the filtered mixture and used to massage the head every evening)	Culinary

Table 6.1 (continued)

Botanical taxon (Family)	English name (Serbian name)	Part used[a]	Properties, medicinal use, and preparation[b]	Other purposes
Vaccinium myrtillus L. (Ericaceae)	Blueberry (Borovnica)	Fr; L	*I*: Astringent, diuretic, vasoprotective, lowering blood sugar levels; for anemia, varicose and thread veins, poor circulation, improving blood supply to veins and capillaries (leaf, tea); for diarrhea (dried fruits), the fresh fruit is a laxative	Culinary (juice, jam)
Vaccinium vitis idaea L. (Ericaceae)	Lingonberry (Brusnica)	Fr	*I*: Diuretic, for urinary tract infections and the formation of kidney and urinary bladder stones (tea or fruits eaten)	Same as *V. myrtillus*
Valeriana officinalis L. (Valerianaceae)	Valerian (Odoljen)	R	*I*: Sedative, for arrhythmia (tea); for stomach complaints (tincture) *E*: For stomach pains in children and helping them sleep peacefully (bath soak: mixture of valerian and tansy)	
Verbascum phlomoides L. (Scrophulariaceae)	Woolly mullein (Divizma)	*I*	*I*: Diuretic, analgesic, expectorant, antiseptic properties; for respiratory ailments: bronchitis, laryngitis, asthma, influenza, tuberculosis (tea) *E*: For rheumatic pain (oil: olive oil or sunflower oil is poured over fresh flowers and this is left in the sun for 30–40 days)	
Verbena officinalis L. (Verbenaceae)	Vervain (Verbena)	AP	*I*: Diuretic, calming the nerves, increasing perspiration; for insomnia, depression, migraines, and nervousness (tea); for fevers, lowering high temperatures, reducing inflammation and relieving pain (tea) *E*: Poultice for gum disease, gargled with tea for mouth and throat infections	
Viola tricolor L. (Violaceae)	Wild pansy (Dan i noć)	AP	*I*: Laxative and diuretic, cleansing toxins and reducing inflammation; a gargle for mouth and throat infections (tea) *E*: For skin complaints, swelling, and varicose ulcers (a compress with tea)	

[a] Part used: *AP* aerial part, *B* bark, *Bu* buds *F* flower, *Fr* fruit, *I* inflorescence, *L* leaf, *N* needles, *R* root, *Rh* rhizome, *S* seed, *T* tuber, *YAP* aerial parts before flowering, *WP* whole plant

[b] *I* internally, *E* externally

Table 6.2 The traditional uses of plants from wild flora in veterinary medicine

Botanical taxon (Family)	English name (Serbian name)	Part used[a]	Preparation and usage
Acer pseudoplatanus L. (Sapindaceae)	Sycamore maple (Gorski javor)	YBL	*I*: For illnesses in hens (the branches with leaves are soaked in water, which the hens then drink)
Asarum europaeum L. (Aristolochiaceae)	European wild ginger (Kopitnjak)	L	*I*: For worms in calves (the leaf is boiled in water, which is given to bull calves to drink)
Artemisia absinthium L. (Asteraceae)	Absinthe wormwood (Beli pelin)	AP; L	*I*: For worm infestations. *E*: The aerial part rubbed into cattle's skin is used as a fly repellent; ground fresh leaves mixed with lard applied to cattle's skin
Dryopteris filix-mas L.♂♂ (Polypodiaceae)	Male fern (Navala)	Rh	*I*: For intestinal parasites (extract of taproot)
Geranium robertianum L. (Geraniaceae)	Herb Robert (Zdravac)	AP	*I*: Treating swelling in pigs (tea is given to pigs to drink)
Helleborus odorus W.K. (Ranunculaceae)	Hellebore (Kukurek)	St	*E*: Put the cleansed stem in the sick sheep's ear perforated with a knife; leave until the whole area surrounding the perforation becomes torrid; the whole treated area falls off, with only the hole remaining
Hypericum perforatum L. (Hypericaceae)	St John's Wort (Kantarion)	AP	*I*: Treating bloating in cattle and sheep (tea is given to sheep and cows to drink)
Inula hirta L. (Asteraceae)	Downy elecampane (Žuta rada)	WP	*E*: Plant juice is mixed with brandy, rubbed into the sore area and bandaged
Lactuca quercina L. (Asteraceae)	Wild lettuce (Divlja salata)	AP	*I*: For hens in the case of illness or epidemic
Rumex sp. (Polygonaceae)	Sorrel (Zelje)	S	*I*: For diarrhea (seeds boiled in water, which is given to piglets to drink)

Table 6.2 (continued)

Botanical taxon (Family)	English name (Serbian name)	Part used[a]	Preparation and usage
Sambucus ebulus L. (Adoxaceae)	Danewort (Aptovina)	L	*I*: For snake bites (juice from the ground leaf applied directly to the bite)
Tanacetum vulgare L. (Asteraceae)	Tansy (Povratič)	AP	*E*: Tea is used to rinse maggot-infested areas on cattle
Teucrium montanum L. (Lamiaceae)	Mountain germander (Trava iva)	AP	*E*: For foot-rot (tea is used to rinse wounds on cows)
Thalictrum aquilegiifolium L. (Ranunculaceae)	Meadow rue (Očobajka)	WP	*I*: Improving appetite in sheep (tea given to sheep when they are unable to graze)
Ulmus campestris L. (Ulmaceae)	Common elm (Brest)	R; L	*E*: For neck pains (tea made from ground root is used to anoint a cow's neck)

[a] Part used: *AP* aerial part, *L* leaf, *R* root, *Rh* rhizome, *S* seed, *St* steam, *YBL* young branches with leaves, *WP* whole plant

In most cases, conventional medicine confirms the form of treatment for certain diseases and the way in which medicinal herbs are used, which signifies the important contribution of ethnomedicine and ethnopharmacy to global medical knowledge (Tasić 2012).

Of the 80 medicinal herbs described, some grow in the garden or yard of almost every rural household (*Calendula officinalis* L., *Fragaria vesca* L., *Juglans regia* L., *Mentha piperita* L., *Ocimum basilicum* L., *Salvia officinalis* L., *Sempervivum tectorum* L., etc.). Some of them are medicines in the form of food, while others are grown just in case they are needed for treatment.

Medicinal herbs are of major importance in the spiritual culture of the Serbian people, too—so-called apotropaions (Evil-eye amulets): *Betula pendula* Roth, *Cornus mas* L., *Corylus avellana* L., *Crataegus sp.*, *Ocimum basilicum* L., *Sempervivum tectorum* L., *Tilia* sp., etc. Belief in the powers of some plants is strongest in eastern Serbia, which is a result of the presence of different ethnic groups.

Among the medicinal plants studied, some are incorporated into the diet as seasoning due to their aromatic and medicinal properties (*Foeniculum vulgare* Mill., *Hyssopus officinalis* L., *Mentha pulegium* L., *Ocimum basilicum* L., *Origanum vulgare* L., *Salvia officinalis* L., *Thymus serpyllum* L., etc.). Besides medicinal properties, some species have other uses, too (see Table 6.1). For example, in eastern and southern Serbia, the aerial part of *Artemisia annua* L. are used mainly for washing barrels intended for brandy storage (the plant is put into the barrel, steamed with hot water and left for a while; the washed barrel then retains the scent of this plant). Wool was dyed with tea made from *Fraxinus ornus* L., *Smyrnium perfoliatum* L., and *Juglans regia* L. It is well known in all rural areas that the aerial parts of *Xeranthemum annuum* L. and *Linum usitatissimum* L. are used to make household brooms (Milojević 1988; Jarić et al. 2007).

6.2.2.1 Ethnoveterinary Uses of Medicinal Plants in Serbia

Medicinal plants have a role to play in ethnoveterinary medicine, too, but the number used is considerably less than those dedicated to human therapy (see Table 6.2). They are most often used in eastern and southern Serbia, mainly in the treatment of cows, pigs, sheep, and chicken. *Artemisia absinthium* L. is a vermifuge (an agent that expels parasites) and has been used for hundreds of years, particularly in the treatment of roundworms and pinworms. Containing absinthin and thujone, its volatile oil causes it to be very bitter and it is also extremely strong with even a minute amount capable of comatising an adult animal or killing it. Therefore, dried plant material is used instead of the essential oil. The male fern (*Dryopteris filix-mas* (L.) Schott.) is known to be one of the best remedies for tapeworms (*Taenia saginata* Goeze 1782, *Taenia solidum* Linnaeus, 1758) and liver fluke (*Fasciola hepatica* Linnaeus, 1758). However, when taken internally and in high doses, medicines prepared from the male fern may prove fatal and hence experts advise less noxious treatments instead (Jarić et al. 2007).

6.3 Conclusion

The geographic position and orographic and demographic characteristics of the Republic of Serbia have definitely played a certain role in the development of and familiarity with ethnobotany and ethnomedicine, particularly in rural areas. Namely, 83.3 % of the population of Serbia are Serbs, while approximately 16 % of the population belong to 1 of the 20 ethnic minorities (Statistical Office, Republic of Serbia, 2013). Approximately 43.6 % of the population live in rural areas, mainly situated in the foothills of mountains, but also sometimes at higher altitudes, and they use and share their knowledge of traditional medicine, with the older population (over 60 years old) having the soundest knowledge.

Medicinal plants are directly used in traditional and contemporary medicinal therapy and indirectly, as a source of important medicinal raw materials in the pharmaceutical, cosmetic, chemical, and food industries. Wildcrafting is the predominant means of supplying the market (as high as 90 %). In Serbia, 270 species of medicinal plants are in circulation commercially and they are picked and/or grown in accordance with market demand, which shows that they have the potential to make a significant contribution to the local and national economies. In rural areas, the collection, use, preparation, and trade of medicinal herbs are important components in people's standard of living, and approximately 4000 households are involved in this branch of the economy (Turudija-Živanović 2010). Medicinal plants are also cultivated in plantations, most often found in Vojvodina (the regions of Banat and Bačka), with the most commonly cultivated species being chamomile, lemon balm, valerian, peppermint, hyssop, wild thyme, and marshmallow.

6.3.1 Sustainable Development of Natural Resources of Medicinal Plants in Serbia

There has been an increase in the organic production of medicinal, aromatic, and herbal plants over the past few years in Serbia, particularly in hilly and mountainous regions, which encompass the native habitats for the majority of medicinal and aromatic species. This is a good way of ensuring the rare, endemic, and threatened species are conserved. Likewise, protected areas offer a sound legal and scientific framework for managing the sustainable use of medicinal and aromatic plants by setting quota and extraction zones and by controlling and monitoring collection. Furthermore, protected areas could also benefit from the collection of medicinal plants. Namely, collection in protected areas offers employment and income opportunities, which depend on the conservation of the plants themselves. This might lead to the local population gaining a better understanding of the necessity for conservation measures and could help support the protected areas in southeastern Europe financially, which are heavily underfunded (Kathe et al. 2003).

The survival and vitality of medicinal plants can also be ensured through in vitro cultivation, with the aim of producing a vast number of selected and genetically

identical plants, which is the reason why research into this area is being conducted in Serbia (Dević et al. 2006; Mišić et al. 2009).

In Serbia, environmental protection laws exist and are applied, and these include the protection of wild plant and animal species (Official Gazette of the Republic of Serbia, no. 35/10). Numerous plants with medicinal and aromatic properties appear on the list of protected species (*Alchemilla* sp., *Arctostaphyllos uva-ursi* (L.) Spreng., *Betula pendula* Roth., *Castanea sativa* Mill., *Gentiana lutea* L., *Juniperus communis* L., *Polygonum bistorta* L., *Satureja* sp., *Vaccinium myrtillus* L., etc.), and some are used for food or they have some other use. Legislation provides the basis for the rational use of medicinal plants on a scale that threatens neither their habitats nor their reproduction (Katić et al. 2006).

6.3.2 Final Remarks

Among the Serbian people, particularly in rural regions, there is a strong belief in the power of medicinal herbs. This is linked to traditions originating over the past centuries whereby the majority of the population, faced by a lack of organized health care and support, turned to nature when faced with ailments, most frequently treating themselves with medicinal plants, minerals, and animal products. The sound knowledge of ethnobotany and ethnomedicine in these areas is also a result of the specific geographical position, the great biological diversity, and ethnic and cultural differences.

A large number of plants have a wide variety of uses in many households either in their fresh state or more commonly when dried. The inhabitants of the rural parts of Serbia treat numerous complaints with herbal preparations, accelerate the healing of wounds and other skin damage with balms, and ease the discomfort associated with other serious, often “incurable” illnesses.

Additionally, medicinal plants make up an important part of both domestic and foreign trade. The high quality of plant material from Serbia has ensured commercial success in West European markets for several decades. More recently, medicinal plants have been at the heart of numerous programs and economic initiatives aimed at developing rural areas. Medicinal plants in their fresh or dried form, extracted medicinal substances used as pharmaceutical raw materials, nursery and seed material, and in vitro cultures for regeneration and multiplication, all have commercial value.

Time has shown that nature is the best pharmacy, with its medicines not interfering with the course of nature, but instead stimulating it and keeping it in equilibrium. However, medicinal plants should be used intelligently and rationally, and care should be taken to preserve them for future generations. Unfortunately, over the past few decades, rural regions of Serbia have witnessed trends of permanent depopulation, which will probably cause a partial loss of traditional knowledge. In the future, the ethnobotanical heritage of Serbia should be promoted in a broader sense, through it taking a special role in conservation opportunities as well as the economic initiatives in the region. This entails not only ensuring the development of

rural areas while protecting and maintaining biodiversity and preserving traditional cultures but also helping science to find new raw materials.

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References

Bremner P, Tang S, Birkmayer H et al (2004) Phenylpropanoid NF-kappaB inhibitors from Bupleurum fruticosum. Planta Med 70(10):914–918

Dajić Z, Fabri S, Maksimović S, Vrbničanin S (2000) Analysis of medicinal plants on meadows and pastures in Serbia. Proceedings of the first conference on medicinal and aromatic plants of southeast European countries, VI meeting "Days of Medicinal Plants 2000," Aranđelovac, 29 May–2 June 2000

Dajić Stevanović Z, Ilić B (2005) Sustainable development of natural resources of medicinal and aromatic plants in Serbia. Proceedings of papers of symposium with international participation "Environment for Europe," Belgrade, 5–8 June 2005 (in Serbian)

Dević M, Momčilović I, Kristić D et al (2006) *In vitro* multiplication of willow gentian (*Gentiana asclepiadea* L.) and the production of gentiopicrine and mangiferin. Phyton 46:45–54

Djurdjević L, Gajić G, Jarić S et al (2013) Analysis of benzoic and cinnamic acid derivatives of some medicinal plants in Serbia. Arch Biol Sci Belgrade 65(2):603–609

Drobnjak I (2004) Brancy in ethnomedicine. Hist Med Health Cult 29(Suppl l):49–51

Gajić M, Kojić M, Karadžić D et al (1992) Vegetation of the tara national park. Kosmos, Belgrade

Gruenwald J, Brendler T, Jaenicke C (eds) (2004) PDR for herbal medicines, 3rd ed. Thomson PDR, Montvale

Heinrich M, Pieroni A, Bremner P (2005) Medicinal plants and phytomedicines. In: Prance G, Nesbitt M (eds) The cultural history of plants. Taylor and Francis, Routledge, New York, pp 205–238

Hoareau L, Da Silva EJ (1999) Medicinal plants: a re-emerging health aid. Electron J Biotechn 2(2):56–70

Jarić S, Popović Z, Mačukanović-Jocić M et al (2007) An ethnobotanical study on the usage of wild medicinal herbs from Kopaonik Mountain (Central Serbia). J Ethnopharmacol 111:160–175

Jarić S, Mitrović M, Djurdjević L et al (2011) Phytotherapy in medieval Serbian medicine according to the pharmacological manuscripts of the chilandar medical codex (15–16th centuries). J Ethnopharmacol 137:601–619

Kathe W, Honnef S, Heym A (2003) Medicinal and aromatic plants in Albania, Bosnia-Herzegovina, Bulgaria, Croatia and Romania. WWF Deutschland and TRAFFIC Europe-Germany. German federal agency for nature conservation, Bonn and Vilm

Katić R (1980) The chilandar medical codex No. 517. National Library of Serbia, Belgrade, p 414

Katić B, Savić M, Mijajlović N (2006) The possibility of the placement of forest fruits, medicinal and aromatic plants. Econ Agr 53(3):767–783. (in Serbian)

Kišgeci J, Sekulović D (2000) Medicinal plants of Yugoslavia. In: Proceedings of the first conference on medicinal and aromatic plants of southeast European countries, VI Meeting "Days of Medicinal Plants 2000," Arandjelovac, 29 May–3 June 2000

Lange D, Schippmann U (1997) Trade survey of medicinal plants in Germany: a contribution to international plant species conservation. Federal Agency for Nature Conservation, Bonn

Leaman D (2006) Sustainable wild collection of medicinal and aromatic plants. In: Bogers RJ, Craker LE, Lange D (eds) Development of an international standard, medicinal and aromatic plants. Springer, Netherlands, pp 97–107

Leonti M (2011) The future is written: impact of scripts on the congnition, selection, knowledge and transmission of medicinal plant use and its implications for ethnobotany and ethnopharmacology. J Ethnopharmacol 134(3):542–555

Mihajlov M (1988) Wild medicinal plants and possibility of their exploitation in the region of Brus. Lekovite Sirovine 7:5–12

Mihajlov M (1996) Plant species of the Asteraceae family in folk phytotherapy and their local names in the regions of Majdanpek and Donji Milanovac. Lekovite Sirovine 15:85–92 (in Serbian)

Miler D (2009) Natural medicine. Metaphysica, Belgrade

Milojević B (1988) The use of plants in the folk life in the region of Rtanj in the east Serbia. Lekovite Sirovine 7:89–101

Mišić D, Šiler B, Filipović B et al (2009) Rapid *in vitro* selection of salt-tolerant genotypes of the potentially medicinal plant *Centaurium maritimum* (L.) Fritsch. Arch Biol Sci Belgrade 61(1):57–69

Parojčić D, Stupar D (2003) A historical review of medicinal plants and their use in pharmacology. Timok Med J 28:101–109 (in Serbian)

Ranđelović V, Zlatković B, Jušković M (2005) The medicinal plants of Mt. Radan in southern Serbia. In: Proceedings of the 8th symposium on the flora of south-eastern Serbia and neighbouring regions, Niš, 20–24 June 2005 (in Serbian)

Regulative on the establishment and protection of protected wild plants, animals and Fungi (2010). Annex 1 and 2. Official Gazette of the Republic of Serbia No. 35/10

Runjaić-Antić D, Milinković D (1990) Herbal medical supplements. Arch Pharm 40(6):247–251 (in Serbian)

RZS Republički zavod za statistiku (2013) Statistical Office, Republic of Serbia, Census Popis 2011. http:\\www.popis2011.stat.rs

Sarić M (ed) (1989) The medicinal plants of the Federal Republic of Serbia. SAAS, special edition, book 65, Belgrade (in Serbian)

Stevanović V, Jovanović S, Lakušić D et al (1995) The diversity of the vascular flora of Yugoslavia with a review of species of international significance. In: Stevanović V, Vasić V (eds) The biodiversity of Yugoslavia with a review of species of international significance. Faculty of Biology and Ecolibri, Belgrade, pp 183–219 (in Serbian)

Tasić S (2012) Ethnobotany in SEE-WB countries; traditional uses of indigenous plants. Lekovite Sirovine 32:71–81

Tucakov J (1978) The medicinal plants of Fruška gora. Matica Srpska, Novi Sad (in Serbian)

Tucakov J (1997) Healing with plants. Rad, Belgrade (in Serbian)

Turudija-Živanović S (2010) Trends in the Serbian medicinal and aromatic plant market. Lekovite Sirovine 30:65–84 (in Serbian)

Chapter 7
Medical Ethnobotanical Studies in Kosovo

Behxhet Mustafa and Avni Hajdari

7.1 Introduction

In recent years, the western Balkans have been the focus of an increasing number of field ethnobotanical studies (in Croatia: Pieroni et al. 2003; Pieroni and Giusti 2008; in Kosovo: Mustafa et al. 2011, 2012; in Bosnia and Herzegovina: Redžić 2006, 2007; Šaric-Kundalić et al. 2010a, b, 2011; in Serbia: Milojević 1988; Jarić et al. 2007; Pieroni et al. 2011; in Montenegro: Menković et al. 2011; in Albania: Pieroni et al. 2005; Pieroni 2008, 2010). This has happened for various reasons: the interest of the Western herbal market, which is partly dominated by the trade of medicinal plants originating from this area (Lange 1998; Kathe et al. 2003); the need for documenting the last remaining traces of traditional knowledge (TK) in areas, which also because of their recent political histories have been often labeled as "marginal" and/or even "isolated" in Europe; the increasing economic trends in these countries to develop ecotourism and other sustainable rural activities based upon local biocultural heritage; and, finally, the fact that this area is also considered to be crucial by ethnobiologists as a unique case study for its tremendous biological and cultural/ethnic diversity.

In Kosovo, apart from a review on botanical folk names in diverse Albanian-speaking areas in southeastern and southern Europe (Sejdiu 1984), with the exception of a very recent work carried out by our research group in the Gollak (Mustafa et al. 2011) area and Albanian Alps (Mustafa et al. 2012), no proper ethnobotanical investigations have been conducted thus far. Previous ethnobotanical studies show that medicinal plants still play a crucial role in the sphere of human health in Kosovo, especially in isolated rural areas. Oftentimes, these mountainous com-

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munities have limited or nonexistent access to Western biomedical modalities, and are instead self-reliant on their TK. The local flora is, thus, incredibly important to provide the first health care within the households.

Moreover, the biodiversity richness and unique biocultural heritage of the local people here is something to be highly valued. TK-dependent activities such as sustainable gathering of wild medicinal taxa, their small-scale trade, and production of local high-quality plant-based foods and dairy products can all contribute to the growing ecotourism initiatives. Thus, TK is a critical component to success in the future economic development and biocultural conservation efforts of the region.

7.1.1 Geographic Characteristics of Kosovo

Kosovo is located in the central part of the Balkans and covers an area of 10,887 km^2, bounded by Macedonia, Albania, Serbia, and Montenegro. The relief of Kosovo is variable, constituted by mountains (41 %); 54 % is agriculture land and 5 % for other uses. Topographically, it is a basin enclosed by mountain ranges and hills. The Sharr Mountains are located in the south and southeast side, bordering the Republic of Macedonia. To the west, the Albanian Alps are shared with Montenegro and Albania. In the northern part of Kosovo are the Kopaunik Mountains. The eastern part of Kosovo is mainly hilly, which is part of the Rhodope Mountains. The central region of Kosovo is a hilly ridge running from north to south that divides the territory of Kosovo into two plains, Dukagjini plain "Rrafshi i Dukagjinit" and Kosovo plain "Rrafshi i Kosovës." The Dukagjini plain is located in the southwestern part of Kosovo, whereas the Kosovo plain occupies the northeastern part. These plains are surrounded by the high mountains (Fig. 7.1). Kosovo varies in elevation from 265 (Drini i Bardhë, at the border to Albania) to 2656 meters above sea level (m.a.s.l.). The highest point above sea level is in the south of Kosovo—Gjeravica, with approximately 77 % of its area lying between 500 and 1500 m.a.s.l. Mountainous areas that characterize the Kosovo territory played an important role in preservation of TK, as oftentimes these mountainous areas were isolated with limited access to the centers, so primary care of these communities was based on their TK.

7.1.2 Botanical Diversity of Kosovo

Due to its favorable and characteristic geographic position, Kosovo has a specific climate and hydrology regime, and is geologically very diverse, with volcanic, metamorphic, and sedimentary rocks of varying ages and origins. Moreover, the soils are generally rich with nutrients, providing a good growth medium for plants resulting in a rich level of biodiversity. The actual total flora of Kosovo is estimated to comprise more than 2500 plant species (Krasniqi 1998). There are currently around 1800 plant species known to make up the flora of Kosovo, and these are deposited at the Herbarium of the Faculty of Mathematical and Natural Science of the Uni-

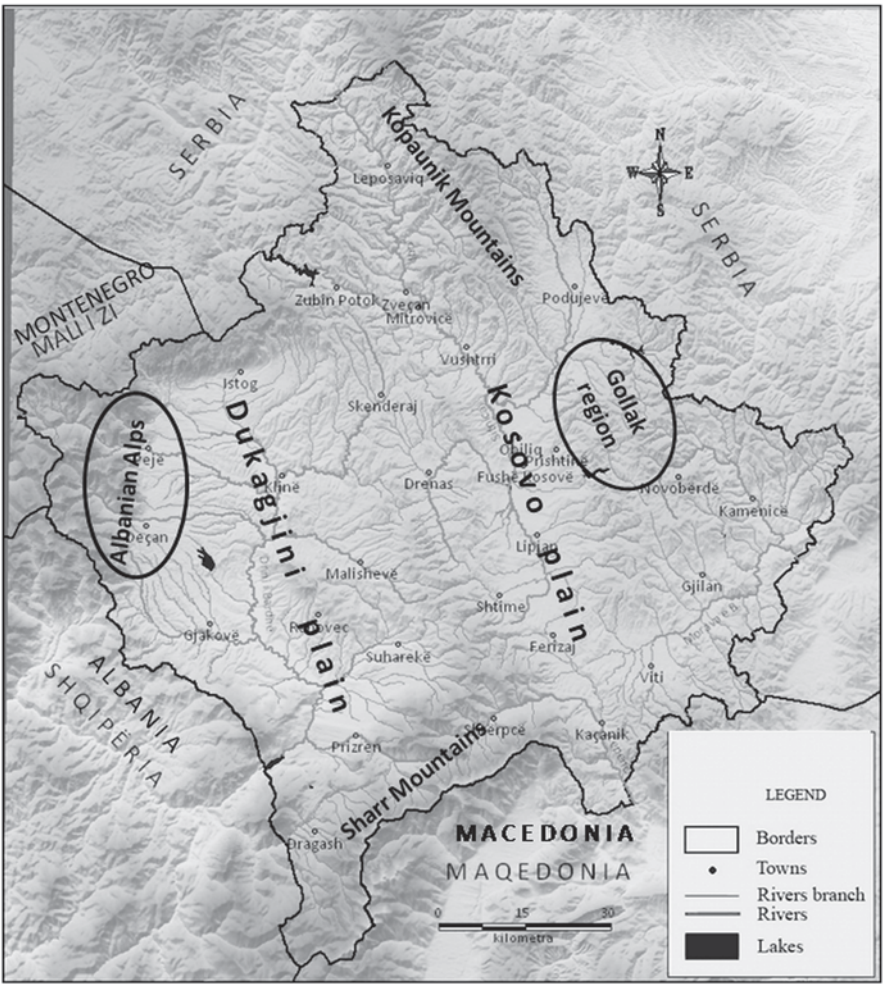

Fig. 7.1 Kosovo relief

versity of Prishtina, which accounts for about 30% of the entire Balkan flora and 16% of the European flora, although Kosovo covers only 2.3% of the Balkan land area (Mustafa 1998). Despite a small surface area, Kosovo is characterized by a rich biodiversity. Two main centers of biodiversity are the Sharri and the Bjeshkët e Nemuna mountains (Stevanovic 1995). About 200 species that occur in Kosovo are Balkan endemics, while 13 are specific Kosovo endemics (Krasniqi 1998). Biodiversity richness is an important factor, which contributes to the high level of TK in Kosovo.

7.1.3 Historical Background

Since the Middle Ages, Kosovo has been known by many names that changed several times and often coincided with continuous historical changes in the borders. The administrative territory named Kosovo was determined in 1877, when the Ottoman Empire established the Kosovo Vilayet, which included the current territory of Kosovo, large parts of Republic of Macedonia, and parts of Serbia and Montenegro. In the beginning, the central Vilayet was Pristina, but later Skopje became the central of Vilayet (Jens Schmitt 2012).

Over two millennia, Kosovo has continuously been occupied and was part of three great empires (Roman, Byzantine, and Ottoman). In the intervals between the decline of one emperor and empowerment of another, Kosovo was occupied mainly by Bulgarians and Serbs. According to Jens Schmitt (2012), when Romans arrived in the Kosovar territory, they were faced with various Illyrian tribes, the best known, most organized, and most powerful of which were the Dardans.[1] The ancient geographers and historians described the Dardans as brave and rebellious. Their rebellions in AD 279 forced the Romans to establish the Dardania province. The Dardania, which included the current territory of Kosovo as well as a part of Republic of Macedonia, had a boom in cultural, urban, and economic development, while in late antiquity its population became mainly Christian. Penetration of Slavic tribes during the seventh century resulted in the destruction of economic values and cultural and urban status of the Albanians. In spite of this widespread destruction, the evacuation of autochthonous populations and tremendous pressures, Albanians preserved their language, culture, and identity.

Byzantine and Slavic invasion led to a significant proportion of indigenous Albanian Catholic population, despite a great resistance to the acceptance of Orthodox religion. The Ottoman occupation for about five centuries resulted in a 70 % conversion to Islam as the dominant religion. Albanians constituted the dominant political and cultural group in Kosovo, but the Ottomans persistently refused to open schools in Albanian and to establish a national state (Islami 1990).

Although the Albanian people were occupied for about 2 millennia by various invaders, they never lost their language, culture, tradition, and identity. Under the control of the Ottoman regime, the Orthodox Church retained certain autonomy and the Slavic–Orthodox population of Kosovo was subject to church judgment, but they followed Christian lessons, too (Jens Schmitt 2012). In Kosovo, for centuries, Albanians, Serbs, Turks, Bosniaks, and Gorani lived in close proximity, which resulted in inevitable mutual cultural influences.

7.1.4 Population of Kosovo

According to the population census (2011), the total number of residents in Kosovo was about 1.8 million, excluding four municipalities in northern Kosovo (Leposav-

[1] The Dardanians were an Illyrian tribe (Albanian ancestor) that lived in the current territory of Kosovo.

iq, Zubin Potok, Zveçan, and Mitrovica North). This figure does not include the estimated 600,000 Albanians who were displaced during the 1990s as a result of Milosevic regime and the 100,000 Serbs and Romani displaced in 1999. It is one of the most densely populated countries in Europe, with an average population density of 177.4 inhabitants per km^2. With a gross domestic product (GDP) of US$ 6.445 billion, Kosovo is one of the poorest countries in Europe (http://www.worldbank.org/en/country/kosovo; Islami 1990).

Population numbers and the ethnic structure have fluctuated over history due to natural growth and the mechanical movements of the population. The intercultural mixing of various communities (Albanians, Serbs, Turkish, Bosnian, and Romani) in the same area has resulted in a dynamic form of TK, with the impact of one traditional culture on another illustrated in both the uses and names of useful plants in the local flora.

7.1.5 Population Migration

This region has been inhabited since ancient times. Recently, the area has been badly affected by migration, due to displacement and a harsh economic climate that impacts the local residents' ability to subsist. Prishtina is the main center in Kosovo, and has the highest concentration of the population, with nearly 11 % of inhabitants now living in Pristina stating that they were born in other regions of Kosovo (or abroad). Recent migrations are happening due to economic crises. The most common directions of migrations in Kosovo are the movement of people from rural areas to urban areas and migration abroad. Migration patterns contribute to the rapid decline of TK of plant species used as medicine, edible products, and handicrafts, as well as to decline in oral transmission of TK from one generation to another.

7.1.6 Medical History

Before the Second World War, health care in Kosovo was almost entirely based on traditional medicine, and these traditions continued after the war as well. Health care was commonly addressed within family, and all physical and mental illnesses were treated with traditional medicines and rituals. These folk-medical traditions continue even now, especially in mountainous and isolated areas. These practices are necessary due to a number of reasons, such as lack of medical institutions and infrastructure in isolated places, which are located far from health-care centers, marginalization of Albanian communities in the former Yugoslavia, etc. After the Second World War, Kosovo had a few health, social, educational, and cultural institutions administrated usually from Yugoslav authorities, where the Albanian language was unofficial. In such conditions, these institutions were unfamiliar to the Albanian community. After 1970, the health-care system improved rapidly, and usually health care was oriented towards modern allopathic medicine; however, this

system was disintegrated after 1990, when the autonomy of Kosovo was taken away by Serbia. From 1990 to 1998, all health-care institutions were administrated by Serbs, and the Serbian language was the only official language. From 1998 to 1999, the health-care system collapsed because of the war. After 1999, the health-care system was reorganized, and this was accompanied by a lot of problems. Except for some private insurance companies, which are very expensive, Kosovo still does not have a health insurance plan covering care from general practitioners. Because of this history, primary health care in Kosovo is still based on traditional medicine, especially for people living in the isolated mountains. Furthermore, people living in such areas are likely to buy nonprescription drugs when ill. Another serious barrier to health-care services is the form of unofficial payments to health-care providers for services that are supposed to be provided at no charge to the patient. Factors promoting these informal payments include perceived low salaries of health staff, a belief that good health is worth paying for, the desire to get better service, the fear of being denied treatment, to reduce waiting times, to maintain good relations for future health care, and giving gifts to express gratitude (Hodgetts 2012).

7.2 Medical Ethnobotany of the Albanian Alps in Kosovo

The Albanian Alps[2] extend within a triangle among the Dinaric Mountains in the northwest, the Sharri (Šar) Mountains in the southeast, and the Rhodope Mountains in the east and northeast. This covers a very pristine and sometimes remote area of ca. 3500 km^2, which is geopolitically divided among the sovereign states of Albania, Kosovo, and Montenegro. About 1000 km^2 of these mountains belong to the Kosovo territory. The Albanian Alps system consists of 24 groups of mountains with 152 peaks higher than 2000 m.a.s.l.,[3] with a large number of gorges, canyons, and valleys, which make them among the most inaccessible (Petrović 1985) but also magnificent areas of the Balkans (Mustafa 1998).

Due to the rich levels of biodiversity characteristic to this region, four national parks were established in the Albanian Alps: one in Montenegro (Prokletije National Park), two others in Albania (Theth and Valbona National Parks), and another one in Kosovo (Bjeshket e Nemuna National Park). Furthermore, Kosovo, Albania, and Montenegro are planning to join these parks and to create the cross-border Balkan Peace Park (Balkans Peace Park Project, http://www.balkanspeacepark.org/). Recent studies on the Albanian, Kosovar, and Montenegrin sides of the Albanian Alps have reported findings on TEK of wild medicinal and food plants (Jarić et al. 2007; Pieroni 2008, 2010; Mustafa et al. 2012).

These unique features are reflected in the high plant biodiversity, which includes 1609 taxa and ca. 150 vegetation units (Amidžić 1999). The most representative

[2] In Albanian, the Albanian Alps are known as Bjeshkët e Nemuna or Alpet Shqipëtare; in Serbo-Croatian, they are known as Prokletije.

[3] The highest altitude in the Kosovo territory is reached by Maja e Gjeravicës at 2656 m.a.s.l.

vegetation units are oriental hornbeam forest (*Carpinetum orientalis scardicu*), hop hornbeam mixed and with oriental hornbeam forest (*Ostryo-Carpinion orientalis*), thermophilous oak forests community (*Quercus frainetto* Ten., *Quercetum frainetto-cerris scardicum,* and *Quercetum petraeae-cerris*), chestnut forests (*Castanetum sativae*), beech forests (*Fagetum montanum*), and pine forests (*Pinetum heldreichii typicum*, *Pinetum heldreichii thalictretum, Pinetum peucis,* and *Pinetum mughi typicum*; Rexhepi 1994; Krasniqi 1972).

People have withstood the extreme conditions of these areas for centuries, including very harsh winters. Until the very recent decades, limitations in infrastructure and communication forced local residents to be self-sufficient in the provision of their health care. As a result, their primary pharmacopoeia consisted of local medicinal plants. Ethnobotanical field research was conducted in 36 villages belonging to the municipalities of Pejë and Deçan, located close to the Koprivnik and Strellc mountains, and which represent the central group of the Albanian Alps located in the western part of Kosovo. The summary of the results collected from communities located in the Albanian Alps of Kosovo (Mustafa et al. 2012) revealed that 98 species (belonging to 39 families) are employed in the traditional medicine of the area. This includes 3 fern species, 3 gymnosperms, and 92 angiosperms (84 dicotyledonous and 8 monocotyledons); 74 taxa are wild. Of these species, *Achillea millefolium* L., *Cornus mas* L., *Hypericum perforatum* L., *Juglans regia* L., *Juniperus communis* L., *Malus sylvestris* Mill. *Plantago major* L., and *Sambucus nigra* L. were cited by more than 30% of the informants. From 98 species presented in Table 7.1, 23 species are also included in the official pharmacopoeia of Europe (European Pharmacopoeia 2007).

The predominantly quoted botanical families were Rosaceae (12%), Asteraceae (10%), and Lamiaceae (5%). These same three "top" families were also found to be predominant among the wild medicinal taxa used in the folk medicine of the Alps in Montenegro, Albania, and in the Gollak region in Kosovo (Mustafa et al. 2011; Pieroni 2005; Pieroni 2008, 2010; Menković et al. 2011).

The most frequently quoted manner of preparation of medicinal plants was represented by decoctions (51%) and infusions (26%). The most frequently cited medicinal uses referred to gastrointestinal (26%) and respiratory (19%) troubles, and illnesses affecting the urogenital system (12%). The first two categories were also the most frequently quoted in the ethnobotanical studies conducted on the Montenegrin and Albanian sides (Pieroni et al. 2005; Pieroni 2008, 2010; Menković et al. 2011).

7.2.1 Most Uncommon Medicinal Plants

Upon analysis of the biopharmacological literature on the quoted medicinal species available on PubMed, we found that it could be worthwhile to further investigate the following reports:

1. The internal use of cold water macerates of the inflorescences of *Carduus nutans* L. in the treatment of eczema (this taxon is scarcely known in the phytochemical

Table 7.1 The most commonly used plant for medicine on the Kosovar side of the Albanian Alps and Gollaku region

Botanical taxon, botanical family, and voucher specimen code	Folk name(s) quoted by respondents	English name	Part(s) used	Administration	TK in the Albanian Alps
Achillea millefolium L. (Asteraceae) 03/DE/10	Hajdukati	Yarrow	Areal parts	Infusion	Antidiarrheal Stomach pain Antidiabetic Eczema
				Tincture topical used in wound	Antibacterial
Aesculus hippocastanum L. (Sapindaceae) 06/DE/10	Gështenja e egër	Horse chestnut	Leaves	Infusion	Expectorant Antirheumatic
			Fruits	Decoction	Antitussive Antihypertensive
				Tincture	Antirheumatic
Allium cepa L. (Amaryllidaceae) 11/DE/10	Qepa	Onion	Leaves	Decoction	To treat influenza
			Bulb	Extracted with cold mineral water	Antihypertensive
Allium sativum L. (Amaryllidaceae) 10/DE/10	Hudhra	Garlic	Bulb Leaves	Tincture	Improve blood circulation Antidiabetic Antibacterial Antihypertensive
				Decoction	Toothache
Althaea officinalis L. (Malvaceae) 07/DE/10	Mëllaga e bardhë	Marshmallow	Roots	Extracted with cold water	Expectorant
				Decoction	To treat lung disorders Oral cavity antiseptic Expectorant
Centaurium erythraea Rafin. (Gentianaceae) 21/De/10	Kiçica	Common centaury	Areal parts	Extracted with cold water	Stomach disorders Urinary system infections
				Decoction	Antihemorrhoid Antidiabetic Lithontriptic Fever
			Stem	Decoction	Lithontriptic
Cornus mas L. (Cornaceae) 24/DE/10	Thana	Dogwood	Fruits	Decoction	Antidiabetic

Table 7.1 (continued)

Botanical taxon, botanical family, and voucher specimen code	Folk name(s) quoted by respondents	English name	Part(s) used	Administration	TK in the Albanian Alps
				Tincture	Stomach disorders Antirheumatic
				Consumed	Eaten raw
				Decoction	Antianemic
Crataegus monogyna Jacq. (Rosaceae) 19/DE/10	Murrizi	Oneseed	Areal parts	Infusion	Heart rhythm regulator Antihypertensive
			Fruits	Decoction	Antihypertensive
			Flowers	Decoction	Antihypertensive Insomnia
Gentiana lutea L. (Gentianaceae) 44/DE/10	Sanëza		Roots	Tincture	Improve the blood circulation Bronchitis Stomach disorders Antihypertensive Antiasthmatic Antirheumatic Antidiabetic
Hypericum perforatum L. (Hypericaceae) 47/DE/10	Kantarioni	St. John's wort	Flowers	Decoction	Stomach pain
			Whole plant	Decoction	Respiratory disorders
			Areal parts	Extracted with olive oil	Stomach pain Skin infections To treat skin after sunburn or thermal burn Antitussive Antihemorrhoidal Respiratory infections Anticholesterolemic Eczemas
Juglans regia L. (Juglandaceae) 52/DE/10	Arra	Common walnut	Roots	Extracted for 1 month with sunflower oil and then liquid mixed with honey	Lung inflammations Antiasthmatic Bronchitis
			Fruits	Decoction	Antitussive
				Honey (1 kg) mixed with fruits (1 kg) extracted for 1 month	Lung inflammations Antiasthmatic Antianemic

Table 7.1 (continued)

Botanical taxon, botanical family, and voucher specimen code	Folk name(s) quoted by respondents	English name	Part(s) used	Administration	TK in the Albanian Alps
				Extracted with cold water	Anticholesterolemic
				Tincture	Stomach disorders
			Leaves	Infusion	Antihemorrhoidal
Juniperus communis L. (Cupressaceae) 51/DE/10	Gllia	Juniper	Fruits	Decoction	Back pains
				Extracted for ten days in cold water mixed with lemons	Kidney inflammations Antirheumatic
				Decoction	Respiratory inflammations
				Decoction	Stomach disorders
Malus sylvestris Mill. (Rosaceae) 61/DE10	Molla e pyllit Molla e egër	European wild apple	Areal parts	Infusion	Antitussive Expectorant
			Fruits	Extracted with cold water then fruit juice mixed sugar	Antihypertensive Anticholesterolemic
			Fruits	Decoction	Antidiabetic
			Leaves	Applied topically in wound	Wound infections
Matricaria recutita L. (Asteraceae) 59/DE/10	Kamomili	Chamomile	Areal parts	Infusion	Stomachache Oral cavity inflammations Gingivitis Urinary system infections
			Flowers Flowers	Infusion	Oral inflammations Urinary system infections
				Decoction	Constipation
			Areal parts	Infusion	Drunk as a tea
Pinus sylvestris L. (Pinaceae) 69/DE/10	Çetina	Scots pine	Cones	40 cones mixed with honey (1 kg) eaten after one month	Bronchitis
				Decoction	Antitussive Antiasthmatic Bronchitis

Table 7.1 (continued)

Botanical taxon, botanical family, and voucher specimen code	Folk name(s) quoted by respondents	English name	Part(s) used	Administration	TK in the Albanian Alps
Plantago lanceolata L. (Plantaginaceae) 73/DE/10	Dejzi heshtor	Narrowleaf plantain	Leaves	Fresh leaves applied topically in wound	Wound infections
Plantago major L. (Plantaginaceae) 67/DE/10	Dejzi gjethegjerë	Common plantain	Leaves	Infusion	Back pains
				Eaten squeezed juice mixed with honey	Bronchitis Antihemorrhoid Stomachache
				Applied topically in wound	Wound infections
Sambucus nigra L. (Adoxaceae) 85/DE/10	Shtogu	Elderberry	Stem cortex	Extracted with sunflower oil	To treat sunburns
				Boiled with butter milk	To treat thermal burns
			Flowers	Infusion mixed with lemon and sugar	Antiasthmatic Bronchitis
				Infusion	Antitussive
			Fruits	Drunk with fruit juice	Antianemic
			Areal parts	Decoction	Antiallergic
Thymus spp. (Lamiaceae) 93/DE/10	Shpirti i nënës	Wild thyme	Areal parts	Decoction	Respiratory inflammations Expectorant
			Whole plant	Infusion	Bronchitis Antitussive Expectorant
			Areal parts	Infusion	Lung inflammations Expectorant
Urtica dioica L. (Urticaceae) 97/DE/10	Hithi	Common nettle	Leaves	Eaten fresh	Antianemic
			Leaves and stem	Tincture	Improve blood circulation
			Roots and leaves	Decoction	Alopecia
			Roots	Decoction	Antihemorrhoidal

and pharmacological literature). In 2000, a Turkish research group pointed out the hepatoprotective effects of extracts from this plant (Aktay et al. 2000).
2. The internal use of decoction of the roots of *Echinops bannaticus* Rochel ex Schrad. for kidney stones (despite a few studies on other species of the genus *Echinops*, this Balkan species is largely underinvestigated).
3. The internal use of decoctions of aerial parts of *Orlaya grandiflora* Hoffm. for its laxative effects (the plant is completely unknown in the phytopharmacological literature).

7.2.2 Comparison with the Albanian and Montenegrin Alpine Ethnobotanical Literature

The cross-cultural analysis of data gathered in the Kosovar part of Albanian Alps (number of participants = 91; Mustafa et al. 2012) with those in northern Albanian Alps (number of participants = 62) and Prokletije Mountains—Montenegro (number of participants = 75)—are presented in Fig. 7.2. This illustrates the similarity between the wild medicinal plants used and recorded in the Kosovar Albanian Alps

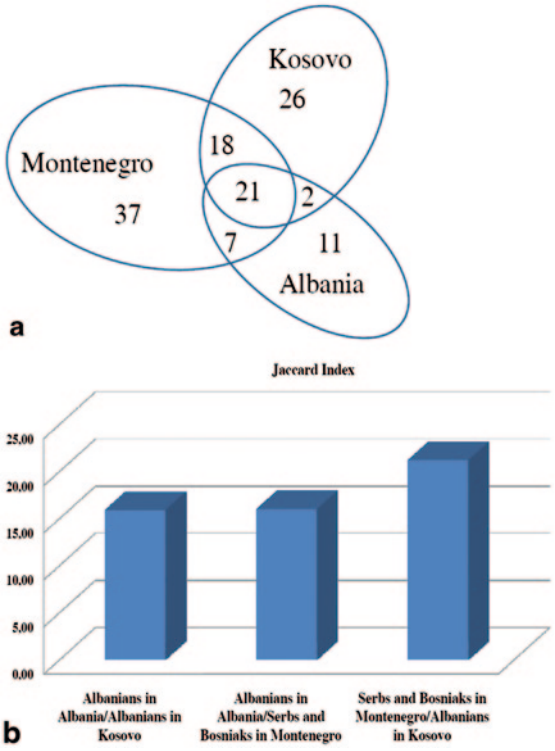

Fig. 7.2 **a** Representation of the commonalities among the wild medicinal species quoted on the Kosovar, Montenegrin, and Albanian sides of the Albanian Alps. **b** Jaccard similarity index of the wild medicinal plants used in the Kosovar, Albanian, and Montenegrin sides of the Albanian Alps

with those recorded in the Montenegrin and Albanian sides of the same Albanian Alps.

The link between the medical ethnobotany of the Montenegrin and Kosovar sides of the Alps—despite the different ethnicity/language of the local populations—appears stronger than the link between the ethnobotany of these two locations and the ethnobotany of Albania.

This apparent paradox could be explained in a number of ways:

1. Different sampling techniques may have been adopted during the field survey in the three locations or the socioeconomic background of the interviewees could have been different. For example, on the Albanian side of the Alps, the previous ethnobotanical studies selected local informants from very remote areas, which remained quite isolated during Communist times and with very limited access to urban environments and culture. It could be especially worthwhile to further assess the influence of the popular phytotherapeutical literature on folk medicine in Montenegro and Kosovo, since during the Yugoslavian time this kind of popularized knowledge was said to be "en-vogue." For example, this is very evident in the Montenegrin data, where a number of possible "modern" uses of local medicinal plants (i.e., *Hypericum perforatum* used as an antidepressant) were recorded.
2. The study sites chosen in Kosovo and Montenegro are, on average, located at lower elevations than the sites selected in northern Albania, thus resulting in a partially different ecological setting and availability of certain species in the environments.
3. Both the Montenegrin and Kosovar sides of the Albanian Alps have had a common history for most of the twentieth century, since belonging to the same country (former Yugoslavia). This may have "homogenized" eventual preexisting differences in plant perceptions/uses between the Albanian and Slav communities. Moreover, a few South-Slav communities (i.e., Bosniaks: Redžić 2006, 2007; Redzic 2010; Šaric-Kundalić et al. 2010, 2011) could be surely considered much more "herbophilic" than the Albanian ones, and this may have influenced folk medicine of the Kosovar population to a certain degree during the last century, because Kosovars have always lived in contact with the Slavs.
4. The Montenegrin study included self-declaring Serbian and Bosniak communities. However, a large part of the Bosniak community living in the Gusinje area is represented also by "bosniakized" Albanians, whose Catholic tribes settled on this side of the Albanian Alps and converted to Islam a couple of centuries ago (Baxhaku and Kaser 1996). This could mean that the ethnobotanical data of Montenegro and Kosovo may actually refer to the same core of Muslim Albanians.

Despite the commonalities found on the quoted medicinal plants, results show the different uses of the wild taxa, which have been most quoted on all three sides of the Alps (Mustafa et al. 2012). It is interesting to underline that the folk uses of the wild medicinal taxa recorded in Kosovo often include both the uses recorded in Albania and those in Montenegro. It would then appear that the medico-ethnobot-

any of Kosovo—because of its history in the last century and the exposure to the South-Slavic ethnobotanical traditions—has possibly incorporated both Albanian and Slavic plant uses (Mustafa et al. 2012).

7.3 An Ethnobotanical Survey of the Gollak Region, Kosovo

The Gollak region is located in the eastern part of Kosovo (see Fig. 7.1). This region is dominated by forests and pastures, with altitudes ranging from 800 to 1260 m.a.s.l. (Çavolli 1997). The climate of the Gollak region is influenced by continental air masses. For this reason, it has cold winters and hot summers. The average temperature was 12.6 °C, whereas the average temperature under zero was −5.8 °C. This area is characterized by total annual precipitation of 667 mm/year.

The diversity in climate and geological and soil composition provides an interesting source of diversity of flora and vegetation of this region. Since the flora of Kosovo belongs in different biogeographic zones (Eurosiberic, North American region, Mediterranean, and Alpine-Nordic regions), the mountainous terrain contributes to a great diversity in flora (Mustafa 1998). Differences in altitude and diversity of other ecological factors have supported the establishment of different vegetation zones on its vertical profile, which is dominated by forest plant communities: *Quercetum farnetto-cerris scardicum, Querceto-Carpinetum orientalis, Quercetum montanum,* and *Fagetum moesiacae montanum* (Krasniqi 1972), and herbaceous plant community: *Trifolio festucetum vallesiaceae* and *Inulo danthonietum alpinae* (Rexhepi 1994).

7.3.1 Wild Food and Medicinal Plant Uses

An ethnobotanical field study focused on traditional uses of medicinal plants, wild food plants, and mushrooms was conducted in 37 villages in the Gollak region of eastern Kosovo. Interviews with 66 elderly informants were conducted using standard ethnobotanical methods. The results of the field survey for most quoted taxa are presented in Table 7.2, arranged in alphabetical order by genus. We found that 98 taxa (belonging to 47 families) are employed in the traditional foods and medicines of the area. This includes 6 mushroom species, 3 gymnosperms, and 92 angiosperms (76 dicotyledonous and 6 monocotyledons). The predominant families were Rosaceae (21 %), Asteraceae (7 %), Lamiaceae (5 %), and Alliaceae (4 %). Approximately two thirds of the recorded medicinal species were wild.

Most wild plants collected in the villages of Gollak were used for medicinal purposes, while a few (16 %) were used food; some other taxa were gathered for sale in the local markets. The most frequently cited medicinal uses referred to respiratory system illnesses (18 %), skin inflammations (16 %), gastrointestinal troubles (14 %),

Table 7.2 The most commonly used plants for medicine in the Gollak region. (Source: Adapted from Mustafa et al. 2011)

Botanical taxon, botanical family, and voucher specimen code	Albanian folk name(s)	English name	Part(s) used	Administration	Treated disease(s) or medical/food uses(s) in Gollak
Achillea millefolium L. (Asteraceae) 79/GO/09	Barëpezmi Bari për pezmatim Lule e bardhë	Yarrow	Flowering aerial parts	Decoction	Fever Stomach disorders Hepatic disorders
			Flowers	Decoction, externally	Skin irritations Acnes
			Leaves	Fresh leaves, topically applied	Wounds
Allium cepa L. (Alliaceae)	Qepa	Onion	Bulb	Boiled with soap and after cooling applied on the nail	Nail infections
				Decoction of onion bulbs mixed with squeezed lemons.	Antitussive
				Decoction	Sore throat Antitussive
				Boiled in milk	Antitussive
Allium sativum L. (Alliaceae)	Hudhëra, Hudra	Garlic	Bulb	Rubbed on the warts Bulb juice applied into the ear	To treat the warts Earache
				Eaten fresh	Antihypertensive
				Boiled in milk (four to five cloves) and drunk as tea	To "disinfect" the intestine
Cornus mas L. (Cornaceae) 35/GO/09	Thana	Dogwood	Fruits	Decoction	Antidiarrheal
				Infusion	To improve the blood circulation Antihypertensive Antidiarrheal Antidiabetic
			Bark	Decoction	Antieczema
			Fruits	Decoction	Antihemorrhoid

Table 7.2 (continued)

Botanical taxon, botanical family, and voucher specimen code	Albanian folk name(s)	English name	Part(s) used	Administration	Treated disease(s) or medical/food uses(s) in Gollak
Corylus avellana L. (Betulaceae) 15/GO/09	Lajthia	Hazel	Fruits	Eaten	Antidiarrheal
				Mixed with honey	Aphrodisiac
			Leaves	Infusion	Antidiabetic Antianemic
Crataegus monogyna Jacq. (Rosaceae) 48/GO/09	Murrizi	Oneseed hawthorn	Flowers	Infusion	Neurorelaxant
			Fruits	Infusion	Antihypertensive Antidiabetic Heart pulse regulator Vasoconstrictor Used to treat fever
Hypericum perforatum L. (Hypericaceae) 32/GO/09	Balsami Bari i zojave Kantarioni Lulë balsami	St. John's wort	Flowers	Infusion	Stomach disorders Genital infections
			Aerial parts	Infusion	Urinary system infections Stomach disorders Antidiabetic
				Mixed with olive oil, used after 40 days, topically applied	Antihemorrhoid
Juglans regia L. (Juglandaceae) 22/GO/09	Arra	Common walnut	Fruits	Fruit cortex, topically applied	Warts
			Leaves	Infusion	Anticholesterolemic Antidiabetic
				Tincture	Antirheumatic
Juniperus communis L. (Cupressaceae). 12/GO/09	Gllija, Kllija	Juniper	Cones	Mixed with thyme, chamomile and St. John's Wort and olive oil	Sinusitis Antiasthmatic Kidney pain
			Cones and young branches	Infusion	Lithontriptic Menstrual pains

Table 7.2 (continued)

Botanical taxon, botanical family, and voucher specimen code	Albanian folk name(s)	English name	Part(s) used	Administration	Treated disease(s) or medical/food uses(s) in Gollak
Malus sylvestris Mill. (Rosaceae) 59/GO/09	Molla e egër	European wild apple	Fruit	Squeezed, externally applied	Warts
				two to three drops of fruit juice applied in ear	Earache
				Decoction	Headache
				Infusion	Antihypertensive Antidiarrheal
			Flowering areal parts	Infusion	Mucolithic
Matricaria chamomilla L. (Asteraceae) 99/GO/09	Kamomila Kamelicë	Chamomile	Flowering areal parts	Decoction	Sinusitis Stomach pain Skin spots Antirheumatic
			Leaves	Boiled in milk, applied in neck	Tonsillitis
Plantago lanceolata L. (Plantaginaceae) 03/GO/09	Dejzi me gjethe të ngushta	Narrowleaf plantain	Leaves	Fresh leaves are topically applied	Skin inflammations
				Boiled with soap and topically applied	Nail infection
Plantago major L. (Plantaginaceae) 04/GO/09	Bari me dejzi, Bari me fije, Dejzi femror	Common plantain	Leaves	Mixed with milk cream, topically applied	Nail infections Skin ulcers
				Infusion	Urogenital infections
				Fresh leaves, topically applied	Antivenom
				Macerated fresh leaves, topically applied in breast	Stimulating lactation
Primula veris Huds. (Primulaceae) 30/GO/09	Aguliçja	Cowslip	Flowers	Infusion	Antitussive
Prunus spinosa L. (Rosaceae) 49/GO/09	Kulumria	Blackthorn	Fruits	Infusion	Antihypertensive Angina pectoris

Table 7.2 (continued)

Botanical taxon, botanical family, and voucher specimen code	Albanian folk name(s)	English name	Part(s) used	Administration	Treated disease(s) or medical/food uses(s) in Gollak
Rosa canina L. (Rosaceae) 50/GO/09	Kaça	Dog rose	Fruits	Infusion	Lithontriptic Renal pain Sour throat Antitussive Antidiarrheal Used as tea
Sambucus nigra L. (Caprifoliaceae) 26/GO/09	Shtogu	Elderberry	Flower	Infusion	Antiasthmatic Appetizing Antidiarrheal Respiratory inflammations (bronchitis) Improving blood circulation Sore throats
			Stem	Boiled with milk cream	Skin inflammations Eczemas
Stachys officinalis (L.) Trev. (Lamiaceae) 76/GO/09	Sarushë	Wood betony	Leaves	Fresh leaves are topically applied	Skin infection
				Two to three drops applied in the ear Infusion, topically applied	Earache Menstrual pain; to stop bleeding wounds
Taraxacum officinale Web. (Asteraceae) 77/GO/09	Lulëpipëze, Luleshurdh Lulëpipëze Pipilia	Dandelion	Flower	Infusion	Stomach pain Urinary system inflammations Menstrual pain Respiratory inflammation
				Infusion, added lemon	Anticholesterolemic
			Leaves	Leaves chew for several minutes	Toothaches
			Leaves	Infusion	Lung disorders
Thymus longicaulis Presl. (Lamiaceae) 75/GO/09	Lule bjeshke Timusi		Herb, dried	Infusion	Digestive
			Flowers	Infusion	Mucolithic
Thymus serpyllum L. (Lamiaceae) 67/GO/09	Tymusi	Breckland thyme	Flowers	Infusion	Sedative Influenza

Table 7.2 (continued)

Botanical taxon, botanical family, and voucher specimen code	Albanian folk name(s)	English name	Part(s) used	Administration	Treated disease(s) or medical/food uses(s) in Gollak
Tilia cordata Mill. (Tiliaceae) 05/GO/09	Bliri me gjethe të vogla	Small-leaved lime	Flowers	Infusion	Antibronchitis Insomnia
Urtica dioica L. (Urticaceae) 21/GO/09	Hithi	Nettle	Flowering areal parts	Infusion, used to wash hair	Antidandruff
				Directly applied on the knee	Antirheumatic
			Leaves	Infusion	Antidiabetic Antianemic Antihypertensive

heart diseases (11%), and urinary and genital system (10%). Various vegetative organs, such as leaves, flowers, root, fruits, rhizome, bark, bulbs, tubers, etc., were used. The most frequently quoted manner of preparation of medicinal plants was represented by infusions (42%) and decoctions (25%).

7.3.2 Comparison of Gollak Ethnobotany with the Surrounding Western Balkan Regions

If the proportion of quoted wild medicinal plant genera, which have been quoted both in Gollak and in other regions (especially in Eastern Serbia, southwestern Serbia and in the Albanian Alps), is remarkable, no significant commonalities can be found instead in the actual, specific medicinal wild plant applications. This demonstrates that, despite the examined areas being part of a macroregion, which have had for many centuries common historical trajectories, the local medico-botanical knowledge remains pretty specific to each single area (Mustafa et al. 2011).

These findings confirm that conducting rigorous field ethnobotanical studies with extensive sampling of the interviewees within a cross-cultural perspective does still represent a crucial starting point for an in-depth understanding of how plant knowledge changes across geographies and cultures. It also provides a way to examine to what degree such knowledge is intertwined with plant knowledge coming from other sources (i.e., ancient herbals, popular phytotherapeutical books, and/or new media; Mustafa et al. 2011).

7.4 Future Perspectives

Medicinal plants play a substantial role in the life support systems of local communities in mountain areas in Kosovo. Thus, the TK that we recorded are demonstrative of a remarkable intangible cultural heritage in the area. However, the traditional use of plants is declining due to economic factors such as displacement and urbanization processes, changing lifestyles, social transformations, etc. The ethnobotanical data recorded provide an interesting basis for further phytotherapeutical researches, for fostering sustainable uses of plant resources, and also for promoting local biocultural diversity through ecotourism initiatives. The use of plants and several aspects of folk medicines could be a good starting point for projects concerning the ecosustainable uses of medicinal plants, involving biological conservation and the conservation of local culture heritage.

The biodiversity richness and unique biocultural heritage of the local people of Kosovo is countered by the need for documentation of missing information concerning traditional plant use in understudied areas of Kosovo. Future ethnobotanical work in this arena is urgent and necessary, and should include cross-cultural comparative investigations of field studies conducted among ethnic groups and among neighboring countries in the western Balkans.

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References

Aktay G, Deliorman D, Ergun E et al (2000) Hepatoprotective effects of Turkish folk remedies on experimental liver injury. J Ethnopharmacol 73:121–129

Amidžić L (1999) Visokoplaninska flora i vegetacija. U: Nacionalni Park "Prokletije"—Nucne i strucne, osnove za zastitu planinskog masiva Prokletija. Arhiv Zavoda za zaštitu prirode Srbije, Belgrade

Balkans Peace Park Project (2012). http://balkanspeacepark.org/. Accessed Sept 2012

Baxhaku F, Kaser K (1996) Die stammesgesellschaften nordalbaniens. berichte und forschungen österreichischer konsuln und gelehrter. Böhlau Verlag, Vienna, pp. 1861–1917

Çavolli R (1997) Gjeografia regjionale e Kosovës. Enti i Teksteve dhe i Mjeteve Mësimore i Kosovës, Prishtinë

European Pharmacopoeia (2007) Council of Europe, 6th edn. Brussels, Belgium

Hodgetts A (2012) Investigation into public health care in Kosovo. Balkan Policy Institute (IPOL)

Islami H (1990) Kosova dhe shqiptarët-çështje demografike. Pena, Prishtina, Kosovo, Prishtinë

Jarić Z, Popović Z, Mačukanović-Jocić M et al (2007) An ethnobotanical study on the usage of wild medicinal herbs from Kopaonik Mountain (Central Serbia). J Ethnopharmacol 111:160–175

Jens Schmitt O (2012) Kosova- histori e shkurtër e një treve qendrore ballkanike. Koha, Prishtinë

Kathe W, Honnef S, Heym A (2003) Medicinal and aromatic plants in Albania, Bosnia-Herzegovina, Bulgaria, Croatia and Romania. BfN, Bonn

Krasniqi F (1972) shumska vegetavija brdskoc regiona kosova. Studime nr. 27, Prishtina, Kosovo

Krasniqi F (1998) Veçoritë e florës dhe të vegjetacionit të Kosovës dhe problemi i mbrojtjes së tyre. Kërkime. ASHAK 6:51–66

Lange D (1998) Europe's medicinal and aromatic plants: their use, trade and conservation. TRAFFIC International, Cambridge
Menković N, Šavikin K, Tasić S et al (2011) Ethnobotanical study on traditional uses of wild medicinal plants in Prokletije Mountains (Montenegro). J Ethnopharmacol 133:97–107
Milojević B (1988) The use of plants in the folk life in the region of Rtanj in the east Serbia. Lek Sirov 7:89–109 (in Serbian)
Mustafa B (1998) Basic characteristic of flora and vegetation of Kosovo and danger of their disappearance. Albanian J Nat Tech Sci 5:115–121
Mustafa B, Hajdari A, Pajazita Q et al (2011) An ethnobotanical survey of the Gollak region, Kosovo. Genet Resour Crop Evol 16:1–16
Mustafa B, Hajdari A, Krasniqi F et al (2012) Medical ethnobotany of the Albanian Alps in Kosovo. J Ethnobiol Ethnomed 8:6
Petrović J (1985) Zagađivanje kraških voda u Metohiji. Priroda Kosova 6:53–59
Pieroni A (2008) Local plant resources in the ethnobotany of Theth, a village in the northern Albanian Alps. Genet Resour Crop Evol 55:1197–1214
Pieroni A (2010) People and plants in Lëpushë. Traditional medicine, local foods, and post- communism in a north Albanian village. In: Pardo de Santayana M, Pieroni A, Puri R (eds) Ethnobotany in the new Europe. People, health and wild plant resources. Berghahn, Oxford, pp 16–50
Pieroni A, Giusti ME (2008) The remedies of the folk medicine of the Croatians living in Čičarija, Northern Istria. Coll Anthrop 32:623–627
Pieroni A, Giusti ME, Münz H et al (2003) Ethnobotanical knowledge of the Istro-Romanians of Žejane in Croatia. Fitoterapia 74:710–719
Pieroni A, Dibra B, Grishaj G et al (2005) Traditional phytotherapy of the Albanians of Lepushe, northern Albanians Alps. Fitoterapia 76:379–399
Pieroni A, Giusti ME, Quave CL (2011) Cross-cultural ethnobiology in the western Balkans: medical ethnobotany and ethnozoology among Albanians and Serbs in the Pešter plateau, Sandžak, south-western Serbia. Hum Ecol 39:333–349
Redžić S (2006) Wild edible plants and their traditional use in the human nutrition in Bosnia-Herzegovina. Ecol Food Nutr 45:189–232
Redžić S (2007) The ecological aspect of ethnobotany and ethnopharmacology of population in Bosnia and Herzegovina. Coll Anthrop 31:869–890
Redzic S (2010) Wild medicinal plants and their usage in traditional human therapy (Southern Bosnia and Herzegovina, W. Balkan). J Med Plants Res 4:1003–1027
Rexhepi F (1994) Vegjetacioni i Kosovës. FSHMN, Universiteti i Prishtinës, Prishtina
Šaric-Kundalić B, Dobeš C, Klatte-Asselmeyer V et al (2010a) Ethnobotanical study on medicinal use of wild and cultivated plants in middle, south and west Bosnia and Herzegovina. J Ethnopharmacol 131:33–55
Šaric-Kundalić B, Fritz E, Dobeš C et al (2010b) Traditional medicine in the pristine village of Prokoško Lake on Vranica Mountain, Bosnia and Herzegovina. Scientia Pharm 78:275–290
Šaric-Kundalić B, Dobeš C, Klatte-Asselmeyer V et al (2011) Ethnobotanical survey of traditionally used plants in human therapy of east, north and north-east Bosnia and Herzegovina. J Ethnopharmacol 133:1051–1076
Sejdiu S (1984) Fjalorth etnobotanik i shqipes. Rilindja, Prishtina
Stevanovic V (1995) Biodiversity of Yugoslavia-with list of international importance. University of Belgrade, Belgrade

Part II
Balkan Traditional Plant-Based Foods: Beyond the Ottoman Cuisine

Chapter 8
Wild Food Plants of Dalmatia (Croatia)

Łukasz Łuczaj, Katija Dolina, Norma Fressel and Stjepan Perković

8.1 Introduction

Throughout its history, the Croatian coast has belonged (or parts of it have belonged) to the Roman Empire, the kingdoms of Croatia (and various regional Slavic states), Hungary, the Venetian Republic, the republic of Ragusa, the Austro-Hungarian Empire, the Ottoman Empire, and Yugoslavia. In spite of its changeable political history, the majority of the Dalmatian population has been Slavic for more than a 1000 years, with the addition of a population speaking Venetian, and related dialects belonging to the Roman languages, concentrated mainly on the islands and in major ports. Due to the many cultural influences and rich flora of the region, knowledge concerning the wild edible plants used there represents an important contribution to the ethnobotany of the Mediterranean region (Łuczaj et al. 2013a, b).

In spite of rich traditions of wild plant use as food in Dalmatia, there are relatively few reports concerning this issue. In 1976–1979, Bakić and Popović (1983) interviewed 5000 households on the Yugoslavian coast, all the way from Istria to the present Montenegrian–Albanian border, with the exception of a small section now belonging to Bosnia and Herzegovina and Montenegro, the coast constitutes a part of Croatia. The authors asked which of the local land and water plants and animals were eaten during World War II. Unfortunately, only data for the most commonly used taxa are published. Bakić and Popović report the use of 120 species of vascular

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Table 8.1 Wild plants eaten by coastal households in the former Yugoslavia. According to us the identification of some species in this work is doubtful, though the identification of genera is probably correct. (Adapted from Bakić and Popović 1983)

Botanical taxa	Parts used[a]	% WWII[b]
Asparagus acutifolius L.	Very young shoots	93.8
Taraxacum megalorrhizon Hand.-Mazz.	Aerial parts	92.5
Sonchus oleraceus L.	Aerial parts	91.2
Foeniculum vulgare Mill.	Aerial parts	90
Taraxacum spp. (as *T. officinale* Web.)	Aerial parts	90
Allium ampeloprasum L.	Whole plants	88.8
Tamus communis L.	Very young shoots	82.5
Rubus spp. (as *Rubus dalmaticus* (Ser.) Guss.)	Fruit	80
Rosa spp. (as *R. agrestis* Savi)	Fruit	78.8
Juniperus oxycedrus L.	Fruit	78.7
Diplotaxis tenuifolia (L.) DC.	Aerial parts	70
Quercus ilex L.	Fruit	68.7
Chenopodium urbicum	Aerial parts	66.2
Cichorium intybus L.	Aerial parts	66.2
Beta vulgaris L.	Aerial parts	62.5
Celtis australis L.	Fruit	61.2
Arbutus unedo L.	Fruit	61.2
Leontodon tuberosus L.	Aerial parts	61.2
Eruca sativa Mill.	Aerial parts	60
Pyrus communis L.	Fruit	60
Tragopogon pratensis L.	Aerial parts	58.7
Crataegus monogyna Jacq.	Fruit	53.7
Prunus spinosa L.	Fruit	51.2
Eryngium maritimum L.	Fruit	51.2
Lactuca perennis L.	Aerial parts	48.7
Daucus carota L.	Aerial parts and roots	43.7
Crithmum maritimum L.	Aerial parts	42.8
Crataegus oxyacantha L.	Fruit	42.5
Urtica pilulifera L.	Aerial parts	40
Cornus mas L.	Fruit	38.7
Silene vulgaris (Mch.) Garcke	Aerial parts	37.5
Paliurus spina-christi Mill.	Immature fruits	37.5
Ruscus aculeatus L.	Very young shoots	36.2
Arum italicum Mill.	Tubers, specially prepared	32.5
Cirsium arvense (L.) Scop.	Aerial parts	31.2
Mentha aquatica L.	Aerial parts	30

[a] Parts used: not given in the original text, inferred from our own field experiences
[b] % WWII: Percentage of households using the plant during World War II

plants. Out of these, 38 were used by more than 30% of households (Table 8.1). Apart from fish (also commonly consumed in times of peace), 78 taxa of other water animals were consumed during World War II.

Interesting observations concerning the plants eaten along the Adriatic coast of Croatia can also be found in the edible plant guides of Ljubiša Grlić (e.g., 1986, 2005). Valuable information on the wild herbs eaten on the island of Korčula is also

present in a conference paper by Sardelić (2008). Scattered information on edible wild greens can also be found in Šugar's (2008) dictionary of Croatian plant names. The report on wild food plant use of Herzegovinian fishermen on the border of Dalmatia (Ćurčić 1913) is also a valuable and interesting source.

Last, but not least, many interesting pieces of information were gathered in two recent studies: One of wild vegetables sold in Dalmatian markets (Łuczaj et al. 2013a) and another, on wild food plants used in northern Dalmatia, around lake Vrana (Łuczaj et al. 2013b). Further studies on wild food plant use in Dalmatia (e.g., around Dubrovnik) by the authors of the article (ŁŁ and KD) are in progress. Thus, our focus here is to offer a short summary of wild food plants used on the Dalmatian coast based on a number of published sources (Bakić and Popović 1983; Grlić 2005; Šugar 2008; Sardelić 2008; Łuczaj et al. 2013a, b).

8.2 Food Plants in Use on the Dalmatian Coast

8.2.1 Fruits

Cultivated fruit trees are very important in the agroecosystems of the Dalmatian coast. In this climate, so dry in summer, trees can, in contrast to annual or perennial crops, reach deep layers of bedrock, with more moisture, thereby increasing the land's productivity. They also give shade to grazing animals. Apart from cultivated woody species, such as olives, grapevine, almond, walnuts, plums, figs, and citrus fruits, wild woody plants are also utilized. Here, we should list, for example, blackberries (*Rubus ulmifolius* Schott.) and strawberry trees (*Arbutus unedo* L.), whose berries were eaten fresh or added to *rakija*. Another locally important species was *Ceratonia siliqua* L. Children also gathered the fruits of hawthorn (*Crataegus* spp.) and sloe (*Prunus spinosa* L.). Rose hips (*Rosa* spp., mainly *Rosa canina* L., and *R. sempervirens* L.) are still commonly collected, dried, and made into a commonly drunk infusion. Common elements of Dalmatian villages are large trees of *Celtis australis* L. Some of them are planted, while some are self-sown. Once they were a favorite children's snack, but now very few people know about their edibility. In the past, acorns (i.e., the fruits of *Quercus ilex* L. and *Q. pubescens* Willd.) were eaten raw, roasted, or added to dishes in times of food scarcity. This custom is no longer practiced; however, many individuals in the countryside remember it from the era of World War II (Łuczaj et al. 2013b).

8.2.2 Greens

Wild greens are the most widely used category of wild food in Dalmatia (Figs. 8.1, 8.2, 8.3 and 8.4). They are both collected by people themselves and bought in the local vegetable markets. In 2012, all major vegetable markets in Dalmatia were

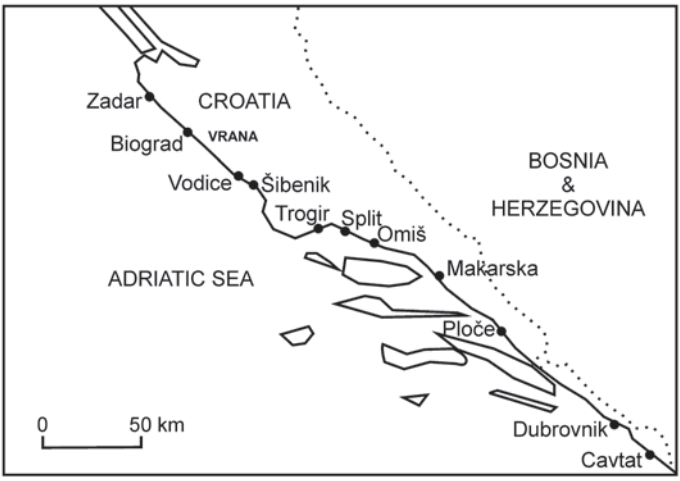

Fig. 8.1 The map of markets visited in Dalmatian towns and the location of the field study in Vrana

Fig. 8.2 Wild vegetables on sale in Omiš

studied. The results of this study have already been published (Łuczaj et al. 2013a; Table 8.2) and here we provide a shortened description of this research study.

8.2.2.1 Study Methods

Because Dalmatia (outside the tourist season) is sparsely populated, vegetable markets are concentrated on the mainland coast, whereas on the islands only single wild vegetable vendors can be approached. The second half of March was chosen for the study period, during the blooming of fruit trees and the appearance of

Fig. 8.3 A seller of wild vegetables in Šibenik. Wild plants are often sold along with self-grown vegetables and homemade olive oil, wine, and brandy

Fig. 8.4 *Tamus communis* and *Asparagus acutifolius* shoots on sale in Dubrovnik

asparagus shoots, as this is usually the top season for selling wild vegetables in the markets. Altogether, 68 wild vegetable sellers were interviewed in 11 markets stretching from Zadar to Cavtat near the Croatian–Montenegrian border. The piles of vegetables sold were searched and photographed (e.g., see Figs. 8.1, 8.2, 8.3).

Herbarium specimens were collected from the sold plants and occasionally interviews with vendors were conducted using flowering specimens collected in the same towns/villages, including plants sold in the markets and those that are not, to give a broader context of plant choice. During each interview, we asked which species were collected from the wild and which were cultivated. Voucher specimens were collected and deposited in the herbarium of the Faculty of Biology of Warsaw University (WA). Precautions for the identification of plants in ethnobotanical studies outlined by Łuczaj (2010a) were taken into account. In the case of specimens without flowers, we tried to identify them using vegetative parts sold and folk names. If the botanical names of plants given as equivalents of the folk names from Šugar (2008), Grlić (2005), and the other cited papers matched the morphological characteristics of the leaves we collected, such identifications were given but labeled with a question mark.

Table 8.2 Comparison of the available data on the use of wild green vegetables on the Adriatic coast of the former Yugoslavia (mainly Dalmatia in Croatia) and adjacent SW Herzegovina

Scientific name (Family)	Other data from Dalmatia and SW Herzegovina[a]	Markets in Dalmatia in 2012
Allium ampeloprasum L. (Amaryllidaceae)	B, D, G, L, M, S	[b]
Allium schoenoprasum L. (Amaryllidaceae)	M	
Allium vineale L. (Amaryllidaceae)	M	
Amaranthus retroflexus L. (Amaranthaceae)	G, L	
Anchusa arvensis (L.) M. Bieb. (Boraginaceae)	C	
Anchusa sp. (Boraginaceae)	C	
Arum italicum Mill. (Araceae)	B	
Asparagus spp. (mainly *Asparagus acutifolius* L.; Asparagaceae)	B, G, C	
Asparagus acutifolius L. (Asparagaceae)	D, L	[b]
Asparagus officinalis L. (Asparagaceae)	M	
Beta vulgaris L. (Amaranthaceae)—wild	B, D, G	Only cultivated
Borago officinalis L. (Boraginaceae)	G, M, S	[c]
Brassica oleracea L. (Brassicaceae)	G	Only cultivated
Bunias erucago L.(Brassicaceae)	D, G, M	
Capparis orientalis Veill. (Capparaceae)	D	
Capsella bursa-pastoris L. (Brassicaceae)	G, L, M	
Chenopodium album L. (Chenopodiaceae)	M, L	
Chenopodium urbicum L. (Chenopodiaceae)	B	
Chondrilla juncea L. (Asteraceae)	L, M	
Cichorium intybus L. (Asteraceae)	B, D, G, L, M, S	*
Cirsium arvense L. (Asteraceae)	B, G	
Clematis vitalba L. (Ranunculaceae)	G	
Crepis sancta (L.) Babc. (Asteraceae)	C, L	[c]
Crepis spp. (Asteraceae)	C, D, M	
Crepis zacintha (L.) Babc. (Asteraceae)	D	[c]
Crithmum maritimum L. (Apiaceae)	B, D, G	
Daucus carota L. (Apiaceae)	B, D, G, L, S	[b]
Diplotaxis tenuifolia (L.) DC. (Brassicaceae)	B, D, G, M	
Erodium cicutarium (L.) L'Hér. ex Aiton (Geraniaceae)	C, L, M	[c]
Eruca sativa Mill. (Brassicaceae)	B, G	
Eryngium maritimum L. and *E. campestre* L. (Asteraceae)	B, G, L	[c]
Foeniculum vulgare Mill. (Apiaceae)	B, C, D, G, L, M, S	[b]
Geranium molle L. (Geraniaceae)	C, L	
Hirschfeldia incana (L.) Lagr.-Foss. (Brassicaceae)	G	
Hypochoeris radicata L. (Asteraceae)	G	
Lactuca perennis L. (Asteraceae)	B	
Lactuca serriola L.(Asteraceae)	D, L, S	[c]
Lamium amplexicaule L.	L	
Leontodon tuberosus L. (Asteraceae)	B	
Malva sylvestris L. (Malvaceae)	L	
Mentha aquatica L. (Lamiaceae)	B	
Myagrum perfoliatum L. (Brassicaceae)	L	

Table 8.2 (continued)

Scientific name (Family)	Other data from Dalmatia and SW Herzegovina[a]	Markets in Dalmatia in 2012
Ornithogalum umbellatum L. (Liliaceae)	G	
Papaver rhoeas L. (Papaveraceae)	C, D, G, L, M, S	[b]
Picris echioides L. (Asteraceae)	D, L	[b]
Plantago coronopus L. (Plantaginaceae)	M	
Portulaca oleracea L. (Portulacaceae)	D, G, L	
Ranunculus cf *neapolitanus* Ten. (Ranunculaceae)		[c]
Ranunculus muricatus L. (Ranunculaceae)	C	
Reichardia picroides (L.) Roth. (Asteraceae)	D, G, M, S	[c]
Rhagadiolus stellatus (L.) Gaertn. (Asteraceae)	C, M	
Rumex pulcher L. and other small leaved *Rumex* spp. (Polygonaceae)	G, C	[c]
Rumex patientia L. (Polygonaceae)	M	
Ruscus spp.(Asparagaceae)	B, D, G, C	
Salicornia herbacea L. (Amaranthaceae)	G	
Salvia verbenaca L. (Lamiaceae)	C	
Scolymus hispanicus L.	L	
Scorzonera laciniata L. (Asteraceae)	L	[c]
Silene latifolia Poir. (Caryophyllaceae)		[b]
Silene vulgaris (Mch.) *Garcke and related species* (Caryophyllaceae)	B, D, G, L, M	
Sinapis arvensis L.	L	
Smilax aspera L. (Smilacaceae)	D, G	
Smyrnium olusatrum L. (Apiaceae)		[c]
Sonchus olearaceus L. and other *Sonchus* spp. (Asteraceae)	B, D, G, C, L, M, S	[b]
Stellaria media L. (Caryophyllaceae)	L	
Tamus communis L. (Dioscoreaceae)	B, D, G, L, M, S	[b]
Taraxacum megalorrhizon (Forssk.) Hand.-Mazz. (Asteraceae)	B	
Taraxacum officinale Weber (Asteraceae)	B, D, G, L, M	[b]
Tordylium apulum L. (Apiaceae)	C, D	[c](erroneously as *Pimpinella peregirna)*
Torilis nodosa (L.) Gaertn.	L	
Tragopogon spp. (Asteraceae)	B, D, G, L, M, S	[c]
Urospermum picroides (L.) Desf. (Asteraceae)	D, G, C	[b]
Urtica dioica L. (Urticaceae)	D, L, S	
Urtica pilulifera L. (Urticaceae)	B, G	
Valerianella locusta L. (Valerianaceae)	M	[c]
Viola arvensis Murr. (Violaceae)	L, M	

[a] *B* Bakić and Popović (in this study it is unclear if the data are about eating green parts or underground organs (1983); *G* Grlić (2005), *C* Ćurčić (1913); *D* personal observations of Katija Dolina, one of the coauthors, from Dubrovnik; *L* Łuczaj et al. (2013b); *M* personal observations of Tihomir Milicević, from central Dalmatia and SW Herzegovina (Łuczaj et al. 2013a); *S* Sardelić (2008)

[b] Most commonly sold wild greens in Dalmatian markets in 2012 (Łuczaj et al. 2013a)

[c] Less commonly sold wild greens in Dalmatian markets in 2012 (Łuczaj et al. 2013a)

8.2.2.2 Study Results

Wild vegetables are sold in all the vegetable markets of Dalmatia. Most vendors sell other products, along with the mixes, mainly homegrown vegetables, homemade olive oil and brandy. Most wild plants are sold in the form of a mix. Only *Asparagus acutifolius* L. (Croatian *šparoga*), *Tamus communis* L. (Cr. *kuka, kukoce*), and *Foeniculum vulgare* Mill. (Cr. morač, *komorač*) are sold in separate bunches (sometimes *A. acutifolius* and *T. communis* are mixed together). Occasionally, a single Asteraceae species is sold separately, mainly *Taraxacum* sp. or *Crepis* sp. One vendor of *Papaver rhoeas* L. shoots was encountered in Makarska. In Ploče, no one sold a species-rich wild vegetable mix: One lady was selling a mix of *Sonchus* sp. and *Papaver rhoeas* and three sellers were selling large bags of *Sonchus oleraceus* on its own.

Three main names for such mixes were encountered during the study:

- *mišancija/mišanca/mješancija* (means literally *the mix,* especially in western Dalmatia)
- *divlje zelje* (literally *wild herbs,* in the whole of Dalmatia)
- and *pazija* (Turkish for beet, Dubrovnik)

In the Vrana Lake area, the name *svakober* is also commonly used, but was not mentioned in any of the markets.

On average, 5.7 species are sold per vendor (median 5). The average number of species in the mix slightly decreased eastwards: the Spearman rank correlation between the position of the market on the coast (Zadar—1, Biograd—2, Dubrovnik—9, Cavtat—10) and the number of species was $r = -0.23$, $P = 0.064$. The total list of plants consists of at least 49 taxa, of which 36 are collected from the wild. The vendors usually sell 1–4 kg of the mix per day, charging 10–20 kuna (US $ 1.6–3.2) per kilogram. Most vendors come to the market regularly, at least once a week. They come from neighboring villages. The average age of sellers is 63; median age, 66.5. Most vendors are older women. Some of them are farmers and have been selling plants in the market since their childhood, others only after retirement. Nine men were also encountered, mostly farmers but also one retired restaurant chef. Except for one seller, who collected the plants himself, it was their wives who collected the mix. Most female sellers claimed that they collected the plants themselves, apart from three younger women who said that their older relatives did it for them. Nearly all of the vendors were able to name every species found in the mix. The sellers came to the market well before 7 am and stayed until 11 am–1 pm.

Most of the bulk weight of the mix is composed of the few most commonly used species. The composition is repeatable although often one to three of the commonest species are missing. The most often used species are sow thistles (*Sonchus* spp., mainly *Sonchus oleraceus* L.), beet (*Beta vulgaris* L.), wild leek (*Allium ampeloprasum* L.), wild fennel (*Foeniculum vulgare* Mill.), prickly goldenfleece (*Urospermum picroides* (L.) Scop. ex F.W.Schmidt), bristly oxtongue (*Picris echioides* L.), common poppy (*Papaver rhoeas* L.), wild carrot (*Daucus carota* L.), dandelion

(*Taraxacum* sp.), white campion (*Silene latifolia* Poir.), and a group of *Cichorioideae* (Asteraceae) taxa called žutenica/radić (mainly *Crepis* spp. and *Cichorium intybus* L.).

Two group taxa involving several botanical species should be pointed out. One is *žutenica/žućenica* or *radič/radić*. This category encompasses a large number of Asteraceae (Cichorioideae) species. These are predominantly *Cichorium intybus* L. and *Crepis* spp. (*C. biennis* L., *C. zacintha* (L.) Babc., *C. sancta* (L.) Babc.), but also other related genera (*Taraxacum officinale* Weber, *Leontodon taraxacoides* (Vill.) Mérat, *Reichardia picroides* (L.) Roth). The respondents do not distinguish them well and usually cannot link the collected rosettes to the flowering forms. Some respondents even claimed that *žutenica/radič* have no flowers and when these plants flower they stop being *žutenica/radić*. Another collective name is *kozja brada* (literally *goat's beard*), applied to a few Asteraceae species, mainly from the genera *Tragopogon* and *Scorzonera*. The vendors reported that they collected the plants in their home gardens or their vicinity, near the sea or in manure-fertilized arable fields. One of the sellers in Šibenik claimed that she watered the arable land on purpose to enhance the growth and germination of edible herbs.

The vendors stated that the tradition of eating wild herbs had existed as long as their grandparents remember. Until the 1960s, herbs constituted a substantial part of people's diet, but today they are used only occasionally, e.g., once a week as a side dish. They are boiled for 10–30 min, strained, and seasoned heavily with olive oil and salt (e.g., 1 kg of wild herbs to 100–150 mL of olive oil). Sometimes *pršut* (dried Croatian ham) is added. In the past (until the 1960s), the wild herbs were mixed with boiled potatoes, polenta, or any other starchy products which were available. Another change our interviewers noticed is that now people have stopped collecting edible roots; they collect only leaves and stalks. In contrast to the thoroughly boiled wild vegetable mix, *žućenica*/*radič* Asteraceae are eaten raw or boiled for a very short time.

The frequency of quoting wild vegetable use in our study from the villages around Lake Vrana in northern Dalmatia is very similar to the frequency of wild vegetables sold in the whole of Dalmatia as recorded in research in local markets. The most commonly collected plants were wild vegetables: *Cichorium intybus* L., *Foeniculum vulgare* Mill., *Sonchus oleraceus* L., *Asparagus acutifolius* L., *Papaver rhoeas* L., *Rumex pulcher* L., *Daucus carota* L., *Allium ampeloprasum* L., and *Silene latifolia* Poir (Łuczaj et al. 2013b).

8.2.3 Aromatic Herbs and Spices

A number of aromatic herbs are used in modern Croatian cooking, mainly *Origanum* spp. and *Thymus* spp. as well as *Rosmarinus officinalis* L. To what extent this is part of the traditional heritage, and to what it extent it is part of a generally strong Italian influence is a matter of debate. Either way, culinary herbs are popular today, and as they are commonly grown in gardens and sometimes also grow

in semiwild and wild states, they are well known to everyone, even people who have forgotten the use of wild greens. Another common condiment (apart from the already mentioned fennel and aromatic herbs) is bay leaf—*Laurus nobilis* L. The plant is found both in cultivated and wild states along the coast and used in a variety of dishes and added to preserved foods.

8.2.4 Underground Parts

Underground plant organs are no longer used in Dalmatia, apart from the occasional consumption of wild carrot roots. However, according to our respondents (Łuczaj et al. 2013a, b) and the literature (Bakić and Popović 1983; Grlić 2005), before and during World War II, people also eagerly sought *Daucus carota* and *Eryngium* sp. roots (information from respondents in the market of Zadar and Vodice).

8.3 Current Trends in Wild Food Use in Dalmatia

The use of wild vegetables on the Croatian coast is still quite common, though it is practiced mainly by older people. Preliminary results from our study suggest that some knowledge and use still remains, but not really on the coast—where the local population is more focused on tourism as the main economic activity. However, just a few kilometers inland, there are villages in the area of Ravni Kotari, where local people subsist on farming and shepherding (Łuczaj et al. 2013b; Fig. 8.5). It must be stressed that the use of wild vegetables all over Croatia gets some media attention in the context of health foods and culinary traditions. For example, a television series "Šumski kuhar" with Anton Rudan (lovacnabilje.com) was made a few years ago and Grlić's books are widely available. Unfortunately, as wild vegetables are collected outside of the tourist season, it is difficult to incorporate them into the menus of coastal restaurants. On the other hand, aromatic herbs of the Lamiaceae family are well known to everyone, highly appreciated, and often incorporated both in traditional and "experimental" dishes.

Prickly asparagus (*Asparagus acutifolius* L.) remains one of the favorite and most prized wild vegetables in Croatia. In 2013, a special quota was introduced on its collection to minimize its environmental impact (Anonymous 2013; Pleše 2013; Sedlak 2013); http://www.zastita-prirode.hr/Odrzivo-koristenje-prirode/Odrzivo-koristenje-zasticenih-prirodnih-vrijednosti/Sakupljanje-zasticenih-vrsta-iz-prirode). Collection of forest products, including wild fungi, became highly regulated. This attracted a lot of media attention and was a popular subject of conversation, even among supermarket workers, during our field research in Dalmatia in Spring 2013.

Due to its location, with a Mediterranean and sub-Mediterranean climate, and due to strong historical cultural connections with Italy and ancient Greece, the choices of plants used in Dalmatia are very similar to those made in Italy, Greece,

Fig. 8.5 A photograph from our field study in Vrana. Collecting wild vegetables is often an additional activity when looking after herds of sheep. The plants are put in the pockets of an apron

coastal parts of Turkey, France, and even Spain (Pieroni 1999; Pieroni et al. 2002, 2005; Marco et al. 2003; Nebel et al. 2006; Tardío et al. 2006; Della et al. 2006; Leonti et al. 2006; Hadjichambis et al. 2008; Turner et al. 2011; Ghirardini et al. 2007; di Tizio et al. 2012; Dogan 2012). A typical feature of the Mediterranean use of wild food plants (as opposed to other parts of Europe) is a relatively long list of wild vegetables used, particularly those from the Asteraceae family. The phenomenon of the widespread use of wild leafy vegetables in nutrition has been coined as *herbophilia* (Łuczaj 2008). In northern Europe, a much smaller number of species of wild greens were used, and they were associated mainly with famine. This phenomenon was named *herbophobia.* It is, however, unclear how old this division of attitudes towards wild greens is, as, for example in Poland, the use of wild greens has undergone substantial changes (i.e., decreased) since the seventeenth century (Łuczaj 2010b). Generally, however, people from Slavic countries used to resort to just a few of the commonest wild greens, ignoring other species. Dalmatia and Herzegovina are notable exceptions (Redžić 2006; Łuczaj et al. 2013a).

References

Anonymous (2013) Sakupljanje zaštićenih vrsta iz prirode. Internet Portal Zaštite Prirode Ministarstva Zaštita Okoliša i Prirode. http://www.zastita-prirode.hr/Odrzivo-koristenje-prirode/Odrzivo-koristenje-zasticenih-prirodnih-vrijednosti/Sakupljanje-zasticenih-vrsta-iz-prirode. Accessed 2 Jan 2014

Bakić J, Popović M (1983) Nekonvencionalni izvori u ishrani na otocima i priobalju u toku NOR-a, Izd. Mornaričkog glasnika, Beograd, pp 49–55

Ćurčić V (1913) Narodno ribarstvo u Bosni i Hercegovini. Part 2. Glas Zemalj Muz u Bosni i Herceg 25:464–465

Della A, Paraskeva-Hadjichambi D, Hadjichambis AC (2006) An ethnobotanical survey of wild edible plants of Paphos and Larnaca countryside of Cyprus. J Ethnobiol Ethnomed 2:34

Dogan Y (2012) Traditionally used wild edible greens in the Aegean region of Turkey. Acta Soc Bot Pol 81(4):329–342

Ghirardini MP, Carli M, Del Vecchio N et al (2007) The importance of a taste: a comparative study on wild food plants consumption in twenty-one local communities in Italy. J Ethnobiol Ethnomed 3:22

Grlić L (1986) Enciklopedija samoniklog jestivog bilja. August Cesarec, Zagreb

Grlić L (2005) Enciklopedija samoniklog jestivog bilja. Ex Libris, Rijeka

Hadjichambis A, Paraskeva-Hadjichambi D, Della A et al (2008) Wild and semi-domesticated food plant consumption in seven circum-Mediterranean areas. Int J Food Sci Nutr 59(5):383–414

Leonti M, Nebel S, Rivera D et al (2006) Wild gathered food plants in the European Mediterranean: a comparison analysis. Econ Bot 60:130–142

Łuczaj Ł (2008) Archival data on wild food plants used in Poland in 1948. J Ethnobiol Ethnomed 4:4

Łuczaj Ł (2010a) Plant identification credibility in ethnobotany: a closer look at Polish ethnographic studies. J Ethnobiol Ethnomed 6:36

Łuczaj Ł (2010b) Changes in the utilization of wild green vegetables in Poland since the 19th century: a comparison of four ethnobotanical surveys. J Ethnopharmacol 128:395–404

Łuczaj Ł, Zovko Končić, Miličević T et al (2013a) Wild vegetable mixes sold in the markets of Dalmatia (Southern Croatia). J Ethnobiol Ethnomed 9:2

Łuczaj Ł, Fressel N, Perković S (2013b) Wild food plants used in the villages of the Lake Vrana Nature Park (Northern Dalmatia, Croatia). Acta Soc Bot Pol 82(4):275–281

Marco C, Chauvet M, Mathez J et al (2003) Les salades sauvages. L'Ensalada champanèla. Les Ecologistes de L'Euzière, Saint Jean de Cuculles

Nebel S, Pieroni A, Heinrich M (2006) Ta chorta: wild edible greens used in the Graecanic area in Calabria, southern Italy. Appetite 47(3):333–342

Pieroni A (1999) Gathered wild food plants in the upper valley of the Serchio river (Garfagnana), Central Italy. Econ Bot 53(3):327–341

Pieroni A, Nebel S, Quave C et al (2002) Ethnopharmacology of liakra: traditional weedy vegetables of the Arbereshe of the Vulture area in southern Italy. J Ethnopharmacol 81(2):165–185

Pieroni A, Nebel S, Santoro RF et al (2005) Food for two seasons: culinary uses of non-cultivated local vegetables and mushrooms in a south Italian village). Int J Food Sci Nutr 56:245–272

Pleše V (2013) U šumu s dozvolama za sakupljanje šumskih plodova. Hrvatske šume 196:5–6. http://casopis.hrsume.hr/pdf/196.pdf. Accessed 2 Jan 2013

Redžić S (2006) Wild edible plants and their traditional use in the human nutrition in Bosnia-Herzegovina. Ecol Food Nutr 45(3):189–232

Sardelić S (2008) Samoniklo jestivo bilje—mišanca, gruda, parapač… Wild Edible Herbs—Mišanca, Gruda, Parapač… Etnološka istraživanja 1(12/13):387–396. (http://hrcak.srce.hr/37036)

Sedlak J (2013) Skupo branje u državnim šumama: Kazna beračima šparoga od 1.000 do 7.000 kuna. http://www.novilist.hr/Lifestyle/Gastro/Skupo-branje-u-drzavnim-sumama-Kazna-beracima-sparoga-od-1.000-do-7.000-kuna. Accessed 2 Jan 2014

Šugar I (2008) Hrvatski biljni imenoslov. Nomenclator botanicus Croaticus. Matica Hrvatska, Zagreb.

Tardío J, Pardo de Santayana M, Morales R (2006) Ethnobotanical review of wild edible plants in Spain. Bot J Linnean Soc 152:27–72

di Tizio A, Łuczaj Ł, Quave CL et al (2012) Traditional food and herbal uses of wild plants in the ancient South-Slavic diaspora of Mundimitar/Montemitro (southern Italy). J Ethnobiol Ethnomed 8:21

Turner NJ, Łuczaj Ł, Migliorini P et al (2011) Edible and tended wild plants, traditional ecological knowledge and agroecology. Crit Rev Plant Sci 30:198–225

Chapter 9
The Use of Wild Plants for Human Nutrition During a War: Eastern Bosnia (Western Balkans)

Sulejman Redžić and Jonathan Ferrier

9.1 Introduction

Even now, in the twenty-first century, one third of the global population is starving and another third verges on hunger. In response, United Nations organizations, including the World Health Organization and Food Agriculture Organization, have given focus to sustenance issues and the discovery of new food resources (WHO 1988, 2000; FAO/WHO 2002). The World Health Organization has raised awareness of insufficient and inadequate food supply and the resulting health consequences (WHO 1990, 2000, 2002). Meanwhile, research is being conducted worldwide to find new food sources from self-grown wild plants (Becker 1983; Guarrera 2003; Ertug 2004; Bussmann et al. 2006; Cruz-Garcia 2006; Lacuna-Richman 2006; Nebel et al. 2006; Tardio et al. 2006; CBD 2005, Hidden Harvest 2014). New discoveries benefit not only those in need but also the whole population. Proper nourishment is an issue everyone faces daily, but becomes problematic during acute and chronic food shortages that occur during wars, exoduses, ghettoes, and famines.

While quality of life can decrease with any unfavorable human interaction, this is particularly true during wars, as they often lead to violent human migrations, military occupation zones, and ghettoes. These areas lack basic living necessities, such as adequate shelter, potable water, and medicine. Furthermore, sufficient and diverse food sources become scarce, while hunger and infectious diseases are common. Under such stress, people adapt and change their lifestyles. Peoples' psychological

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profiles can change entirely, altering their approach to food and medication sources (Smaijkić et al. 1995; Watson et al. 1995; Redžić 2010a). Similar unfavorable environments were common during the war in Bosnia and Herzegovina (B&H), 1992–1995, as observed in Sarajevo, Srebrenica, Žepa, and Zenica (Redžić et al. 2010). Food shortages resulted in population-wide malnutrition, reduction of body mass index (BMI), and general health status changes (Smaijkić et al. 1995; Vespa and Watson 1995). In pregnant women, lack of food and malnutrition was the primary reason for induced abortions (Redžić 1999a; Redžić and Hadžihalilović 2007).

During the war, the need to eat forced populations to consider natural food sources. Due to a scarcity of conventional food resources, war-torn populations began to consume edible wild plants, including dandelion, coltsfoot, and nettle (Redžić 1993; Redžić et al. 2009b), as well as wild animals. Later, the affected populations started to gather local medicinal plants and prepare phyto-pharmaceuticals (Redžić 1999b). Similar behavior has been observed during other unfavorable conditions, such as droughts, famines, and world wars (Goto et al. 1958; Smith Fawzi et al. 1997; Toole and Waldman 1997; Huxley et al. 2000; Griekspoor et al. 2004). Conversely, human populations have chosen death from starvation over consuming wild natural sources of nutrition due to traditional food prejudices (Vračarić et al. 1966; Bakić and Skare-Krvarić 1967; Bakota 1967; Vračarić et al. 1967; Redžić 1993).

Despite increasing food ranges, new food products and consumption of environmental resources in conventional and organic food production, many people remain hungry and malnourished worldwide (Blomhoff 1991; ACC/SNC 1992; Garnier et al. 2003; Simopoulos and Gopalan 2003; Čolić-Barić et al. 2004; Herdt 2004; Sanghvi 2004; De Souza 2006). This occurs most commonly in underdeveloped regions, but can occur in developed regions due to economic oscillations. In efforts to solve hunger worldwide, focus has been growing on natural food resources from wild plants (Guil et al. 1997; Fleischhauer 2003; CBD 2005). One of the first steps in increasing knowledge of these plants is by conducting extensive ethnobotanical research (Tanji and Nassif 1995; Ogoye-Ndegwa 2003; van den Eynden et al. 2003; Addis et al. 2005; Tardio et al. 2005). Ethnobotany provides a foundation for investigations of novel genetic resources in understudied wild plants (Redžić 2007, 2009a; GRIN USDA 2008).

Different wild plant usage patterns and approaches to wildlife have been observed in different parts of the world (Hanazaki et al. 2000; Ladio and Lozada 2001; Turrini et al. 2001; Kristensen and Balslev 2003). Many communities still use wild plants as dietary staples or supplements (Pieroni 1999; Petrovska et al. 2001; Gillespie et al. 2002; Ogle et al. 2003; Pardo de Santayana et al. 2005; Pieroni et al. 2005; Redžić 2006; Pieroni 2008). However, this is no longer practiced across most of the world.

Hunger and fear of hunger are strong factors in remodeling human consciousness, which is frequently more dangerous than hunger itself. In conditions that promote hunger, such as wars, people often experiment on themselves by introducing new wild plants or plant parts into their diets. Self-experimentation is valuable for discovering potentially new food resources and revealing new human behavioral patterns towards wild plants. This process is most prominent in environments of complete isolation, when population survival mode is at its greatest. Examples of

completely altered lifestyles, survival methods, diets, and anthroecological frameworks have been observed throughout B&H. One region of particular interest is in Eastern Bosnia around the Drina river canyon in a small region, Žepa. This paper focuses on the wartime experiences of the Žepa population.

The objectives of this research were to (1) inventory and identify vascular plants crucial to survival of the Žepa human population during wartime conditions and many months of exile between 1992 and 1995; (2) identify usable plant parts; (3) discover edible plant uses, nutritious preparations, and preservation techniques; (4) identify the best time and place for harvesting plants; (5) identify the ecological conditions in which the identified edible plants grew, including habitat and plant community; (6) identify relationships between plant taxonomy and nutritional value; (7) conduct a comparative analysis of the identified plants' edibility rating with an international database (PFAF 2012); (8) assess the medicinal rating and usage of the identified edible plants with an international database (PFAF 2012); and (9) assess human behavior towards food when it becomes a limiting factor for survival.

9.2 Methods

9.2.1 Study Site: Žepa, Municipality of Rogatica, B&H

The study area, Žepa, occupies about 550 km^2 in southeast Bosnia, and borders the Republic of Serbia (43°55′4994″ and 43°57′5115″E and 19°06′4040″ and 19°10′0820″E; Fig. 9.1). Žepa is limited to a region bearing the same name and contains several villages (Kula, Purtići, and Čavčići, Bjelila, Pripečak, Slap, Gvođenje, and Vratar) with around 5000 inhabitants. The region consists of a valley surrounded by tall mountains with steep slopes of over 60°: Veliki Stolac to the east (1673 m.a.s.l.), Devetak to the west, and Veliki Žep (1660 m.a.s.l.) to the north. The altitude varies from 230 to 1000 m.a.s.l. at the bank of the Drina river to the outskirts of the valley, respectively. The entire area resembles an amphitheater facing eastward. Along its eastern border is the Drina river canyon, composed of vertical lime cliffs as deep as 1300 m. The Žepa tributary, a clean mountain rivulet, meets the Drina river on its western bank. Along the canyon, many mountain tributaries cut through the narrow, deep ravine. The canyon is only accessible via the Drina river where there are many caves and semi-caves that provide safe havens for wildlife (Redžić et al. 2008).

The vegetation in Žepa is lush and diverse. The lowest areas are dominated by oak and hornbeam, *Querco-Carpinetum* forest. The slopes to the north are dominated by beech, *Fagetum moesiacae* forest. In warmer parts of the region, with shallow, carbonate soil, the vegetation consists of forests and coppice of downy oak, *Quercus pubescens,* hop hornbeam, *Ostrya carpinifolia,* and flowering ash, *Fraxinus ornus*. The canyon harbors many endemic communities. The most important are the forests of lime and Bosnian maple, *Aceri obtusti-Tilietum mixtum,* and forests of moor grass and hop hornbeam, *Seslerio-Ostryetum*. Steno-endemic communities in the crevices and scree draw special attention. Endemic spruce, *Picea*

Fig. 9.1 The geographical location of the investigated area

omorika, lives at higher altitudes. Places where the forest has been repressed are dominated by rocky ground vegetation of the order *Scorzonero-Chrysopogonetalia,* thermophile meadows of the order *Brometalia erecti,* and mesophile meadows of the order *Arrhenatheretalia* (Redžić et al. 2003). On smaller land plots, people grow vegetables, including onion, cabbage, pepper, potatoes, tomatoes, and Swiss chard, and crops of barley, oats, wheat, and rye. Near the village, there are plum, apple, and pear orchards.

9.2.1.1 Population

The prewar population was about 90 % Bosnian Muslim. The rest were Bosnian Orthodox. Most of the population worked in agricultural production, including cattle

breeding and fruit growing. Due to isolation from roads and urban centers, many people migrated to other places. However, most maintained a connection with their birthplace (SA 1991).

9.2.1.2 Background

In the spring of 1992, aggression was made against the state of B&H (Wikipedia 2009). The aggressor occupied many places rapidly, gaining complete control. Unoccupied areas were besieged and isolated to weaken the local populations and conquer them. One such area was Žepa. Most of the prewar population was Bosnian Muslim. After the siege, the population was ethnically pure, consisting of only about 5000 Bosnian Muslims. The Žepa population successfully resisted the aggressor and maintained their lifestyles. However, as the siege strengthened, living conditions declined and became more dangerous. With no outside help, food reserves diminished. The only connection to the outside world was via radio with some larger cities, including Sarajevo. By autumn of 1992, the stock of conventional food, especially flour, was low. Before the New Year, author Sulejman Redžić broadcasted information over radio from the Center for Assistance to Civilians in Sarajevo to the command post on local plants that could be used as possible flour substitutes, including beech fruit, *Fagus moesiaca,* oak fruit, *Quercus* sp., oak lichen, *Evernia* sp., young spruce twigs, *P. omorika* and *Picea abies,* and the green shoots of *Nasturtium officinale,* densely located around the Žepa rivulet. Soon after, radio connection was terminated. Later, most locals turned to alternative food sources. Some were educated enough to recognize some edible plants, mushrooms, and animals, while avoiding poisonous ones. Although the new source did not sit well with everyone, no one was poisoned by the natural foods and there were no known adverse effects.

After establishing a safe zone under the auspices of the United Nations Protection Forces, conditions improved. However, the conditions again declined in the summer of 1995. The territory was seized successfully, forcing people into dugouts. Hungry, thirsty, and barefoot, some escaped through forests and roadless, forsaken regions to the free territory. They sustained themselves with wild foods, including strawberries, bear's garlic, and mushrooms. Others, mostly men, escaped into the deep and inaccessible canyon of the Drina river. For around 3 months, they lived in caves and semi-caves in the valleys of the steep canyons of several Drina's tributaries. Since they had little conventional food, they had to rely on wild foods. Besides plants and mushrooms, some people ate wild animals, including snails, snakes, and birds. Out of desperation, they broke centuries-old prejudices towards types and sources of food.

9.2.2 Fieldwork

Although the war ended in late 1995 with the signing of Dayton Peace Agreement (Dayton Agreement 1995), the local population never returned to their original

homes. Villages had been burned down or destroyed. Refugees only began to return to this region in greater numbers many years later, most of whom were elderly. However, former inhabitants spend their summers there, maintaining regular contact.

This research used two methods of data collection: (1) gathering plants with surviving soldiers from the "war regions" and showing them to the local population and (2) conducting an ethnobotanical interview with ex-soldiers and the local population.

The botanical and ethnobotanical research was conducted in ten villages in the Žepa region (see Fig. 9.1) from 2004 to 2006. In addition, we established contact with people who had spent several months in wilderness of the Drina river canyon and tributaries. They were crucial in outlining the territory where people had lived during the war and exile. In spring of 2004, summer through early winter of 2005, and spring and summer of 2006, informants toured the area with the author Sulejman Redžić and together identified the plants, mushrooms, and lichens used as food during the war.

The main mode of data acquisition was a direct interview with surviving inhabitants. In total, 50 people were interviewed, 32 males and 18 females. Most were over the age of 50. All of the informants were ethnically Bosnian Muslim. Most plants were collected and identified in situ with Žepa informants. These ethnobotanical collections were later presented to other Žepa informants, revealing consensus on uses and more ethnobotanical details.

The data collected comprised (1) local name of the species; (2) usable parts; (3) time of picking; (4) preservation mode of raw part; (5) purpose; (6) way of preparing nutritious preparations; (7) time of an interview; (8) names, age, sex, and education level of people interviewed; (9) area (name of location); and (10) habitat (forest, meadow, rocky ground, other).

All of the plant material collected during the fieldwork and interviews was pressed and transported to the Center for Ecology and Natural Resources, Faculty of Science, University of Sarajevo, for final determination of species and herbarium curation.

9.2.2.1 Human Participation and Informed Consent

All informants consented to answer all interview questions unconditionally, with no payment in return. They were friendly and willing to participate because the author Sulejman Redžić was well known for his contributions in ethnobotany and ecology and was a recognized host of the trusted national television series of the former Yugoslavia "*Nutrition in Nature.*"

9.2.2.2 Plant and Habitat Identification

The plant material was identified with the help of local flora (Beck-Mannagetta et al. 1983; Josifović 1989). Nomenclature of species' families was given according

to Flora Europea (Tutin et al. 1964–1980). After identification, species were assigned with a voucher number and deposited in the Herbarium of the Center for Ecology and Natural Resources, Faculty of Science, University of Sarajevo (CEPRES HERB).

The habitats of the identified species were determined based on species ecological inclination towards a certain plant community using the methodology of Braun-Blanquet (1964). Ecological conditions were determined using the author's judgment (Redžić et al. 2008). Syntaxonomy was determined according to Oberdorfer (1983).

9.2.2.3 Data Processing

The results were processed in the field and laboratory and yielded the following data: (1) a list of vascular plants used in the diet of the population under siege, (2) local plant names, (3) systematic affiliation of plants and most frequent families, (4) the most frequently used wild plants and their time and place of use, (5) usable parts, (6) methods edible food preparations, (7) habitat and ecological conditions in which the plants grow, (8) types of nutritious preparations, and (9) nutrition value of individual plants.

9.2.2.4 Taxonomical Designations

Some species and even genera were highly variable and too complex for precise taxonomic determination, especially in the sense of a modern taxonomic investigation (Euro Med 2005). Therefore, some forms were understood as aggregates encompassing, in certain cases, some microspecies whose origin is found within these aggregates, including: *Achillea millefolium* agg., *Thymus serpyllum* agg., *Taraxacum officinale* agg., *Rosa canina* agg., and *Rubus heteromorphus* agg.

9.2.2.5 Biological Status of Plants

Plants were grouped into three categories based on the level of human intervention in their cultivation: (1) Wild plant species growing in the wild without human intervention and representing an authentic genetic fund in biodiversity of the area (Redžić et al. 2008). Most of the plants recorded in this research belonged to this group. (2) Semi-cultivated species growing naturally in the wild but often found near human settlements because of their significance to humans. In the study area, these included: *Juglans regia, Malus sylvestris, Prunus avium, Pyrus pyraster, Rumex patientia, Sambucus nigra, Corylus colurna,* and *Tilia* sp. (3) Plants growing in the wild or cultivated or found in horticulture, but adjusted well enough to a particular climate that they grow in the wild, most frequently in anthropogenized habitats. In the study area, *Robinia pseudoacacia* fell in this group, as it formed wild communities in some locations.

9.2.2.6 Determination of Plant Edibility and Medicinal Ratings

The edibility (0, 1, 2, 3, 4, and 5) and medicinal (0, 1, 2, 3, 4, and 5) rankings of each species were based on a comparison with an international database (PFAF 2012). Using the same database, newly identified edible species of plants from the territory of Podrinje, Eastern Bosnia, were determined. They represented an important supplementary food resource for the population.

9.2.2.7 Determination of Plant Nutritional Value

The nutritional value of wild plants was determined from previous data (Vračarić 1977; Zennie and Ogzewalla 1977; Grlić 1980; Redžić 1993; Freiberger et al. 1998; Guil Guerrero et al. 1998; Ozcan 2002; Agrahar-Murugkar and Subbulakshmi 2005; Imran et al. 2007; Redžić 2010a), which referred to related populations of researched species from the similar ecological and geographical area.

9.3 Results

9.3.1 The Most Cited Edible Plants

This research identified 147 species of vascular plants used as supplementary foods by the population of the besieged area, Žepa. The most frequently used species were defined as those mentioned more than ten times. These included *Allium ursinum, Betula pendula, Campanula trachelium, Carpinus betulus, Carlina acaulis, Cichorium intybus, Tussilago farfara,* and *Urtica dioica* (Table 9.1). In addition, some wild fruits that were used as supplementary foods were mentioned more than 30 times. These included: *Cornus mas, Crataegus laevigata*, *Fragaria* spp., *Rubus* spp., *Rosa* and *Corylus, P. avium, P. spinosa, P. pyraster, M. sylvestris,* and *Ribes* spp. (see Table 9.1).

9.3.2 Classification of Wild Edible Plants

Based on their dietary role, all identified plants were classified into seven primary and three secondary groups (Fig. 9.2). Since some species had more than one use, we found 259 different uses, including plants used as or in vegetables, salads, condiments, bread, fruit, beverages, tea, sweets, coffee, and sources of water.

Plants were most commonly used as vegetables (63 species), which often were prepared in stews. The most frequently used species from this category included: *U. dioica, T. farfara, Chenopodium album, Epilobium angustifolium,* and *Pastinaca sativa* (see Table 9.1). The next most common use of plants was in salads

Table 9.1 Wild edible vascular flora of Eastern Bosnia (Western Balkans). Bosnia and Herzegovina's wild nutritious plants here were cross-listed (in bold) with Lebanon FLORA (2013) to help nourish those in need in Syria

Voucher specimen	Scientific name	English common name	Plant family	Part(s) used	Habitat/ community	Edibility rating	Medicinal rating	Preparation/use
Z301101	***Acer obtusatum* Kit.**	Bosnian maple	Aceraceae	Juice and young leaves	*F., Q.p.*	N	N	Beverage/salad
Z301102	*Acer pseudoplatanus* L.	Sycamore maple	Aceraceae	Juice	*F.*	2	1	Mineral beverage
Z311401	***Achillea millefolium*** L.	Common yarrow	Compositae	Young leaves and flowers	*Arrh.*	3	4	Cooked vegetables, condiment
Z314901	*Aegopodium podagraria* L.	Ground elder	Umbelliferae	Young leaves	*O.*	3	2	Cooked vegetables, condiment
Z313901	*Agrimonia eupatoria* L.	Agrimony	Rosaceae	Young leaves	*P.s.*	2	3	Cooked vegetables
Z312401	*Ajuga reptans* L.	Bugle	Labiatae	Young leaves	*Arrh.*	2	3	Cooked vegetables/ condiment
Z313902	*Alchemilla hybrida* Rothm.	Lady's mantle	Rosaceae	Young leaves	*Arrh.*	N	N	Fresh, salad, cooked vegetables
Z302101	***Alisma plantago-aquatica* L.**	Great water plantain	Alismataceae	Ground part and leaves	*Ph.*	1	3	Mush, bread
Z322603	***Allium sphaerocephalon* L.**	Round-headed leek	Liliaceae	Ground part and leaves	*B.e.*	3	2	Fresh salad, condiment
Z322604	*Allium ursinum* L.	Wild garlic	Liliaceae	Aerial and ground part	*F.*	5	3	Fresh salad, condiment
Z313905	***Amelanchier ovalis* Medik.**	Snowy mespilus	Rosaceae	Fruit	*Q.p.*	2	0	Fresh fruit and beverage
Z314902	*Angelica sylvestris* L.	Wild angelica	Umbelliferae	Root and young leaves	*Mol.*	3	2	Cooked vegetables, condiment
Z322613	*Anthericum ramosum* L.	St. Bernard's lily	Liliaceae	Bulb	*Q.p.*	N	N	Mush, bread
Z311425	*Arctium nemorosum* Lej. and Court.	Burdock	Compositae	Root and young leaves	*O.*	N	N	Mush and vegetables
Z311402	*Artemisia vulgaris* L.	Madwort	Compositae	Young shoots	*O.*	2	3	Condiment, cooked vegetables
Z313934	*Aruncus dioicus* Fernald	Goat's beard	Rosaceae	Leaves	*Ad.*	2	2	Salad, cooked vegetables

Table 9.1 (continued)

Voucher specimen	Scientific name	English common name	Plant family	Part(s) used	Habitat/ community	Edibility rating	Medicinal rating	Preparation/use
Z322609	*Asphodelus albus* L.	Asphodel	Liliaceae	Ground part	*S.-Ch.*	2	1	Mush, bread
Z010001	***Asplenium scolopendrium* L.**	Hart's tongue fern	Aspleniaceae	Young leaves	*F.*	0	2	Cooked vegetables, fresh salad
Z314913	*Astrantia major* L.	Great masterwort	Umbelliferae	Young shoots	*Ad., Arrh.*	0	1	Fresh salad/vegetables
Z311803	*Barbarea vulgaris* R. Br.	Yellow rocket	Cruciferae	Young shoots	*Ch.*	3	1	Cooked vegetables/ condiment
Z310501	*Betula pendula* Roth.	Silver birch	Betulaceae	Flowers and juice	*V.-P.*	3	3	Mush, bread, beverage
Z310801	*Campanula glomerata* L.	Clustered bellflower	Campanulaceae	Young shoots	*Arrh.*	4	0	Cooked vegetables/salad
Z310803	*Campanula rapunculoides* L.	Bellflower	Campanulaceae	Young shoots	*B.e.*	3	1	Cooked vegetables/salad
Z310803	*Campanula sibirica* L.	Large bellflower	Campanulaceae	Young shoots	*Q.p.*	N	N	Cooked vegetables/salad
Z310804	*Campanula trachelium* L.	Bats-in-the-belfry	Campanulaceae	Young shoots	*F., Ad.*	N	N	Cooked vegetables/salad
Z310502	*Carpinus betulus* L.	Hornbeam	Betulaceae	Flowers	*F.*	0	2	Mush, bread
Z311405	*Carlina acaulis* L.	Stemless carline thistle	Compositae	Root	*B.e.*	2	2	Fresh, salad and beverage
Z311425	*Cicerbita alpina* (L.) Wallr.	Blue sow-thistle	Compositae	Young shoots	*Ad., F.*	2	1	Cooked vegetables/salad
Z311407	*Cichorium intybus* L.	Chicory	Compositae	Root and young leaves	*Art., Arrh.*	4	3	Mush, salad/coffee
Z311305	*Chenopodium album* L.	Fat hen	Chenopodiaceae	Leaves	*Ch.*	3	2	Cooked vegetables
Z311424	*Cirsium oleraceum* (L.) Scop.	Cabbage thistle	Compositae	Young shoots	*Mol.*	2	0	Cooked vegetables, salad
Z311501	*Cornus mas* L.	Cornelian cherry	Cornaceae	Fruit	*Q.p.*	4	2	Fresh fruit and beverage
Z311603	*Corylus avellana* L.	Hazel	Corylaceae	Male flowers and fruit	*P.s., F.*	5	2	Mush, bread

Table 9.1 (continued)

Voucher specimen	Scientific name	English common name	Plant family	Part(s) used	Habitat/ community	Edibility rating	Medicinal rating	Preparation/use
Z311602	*Corylus colurna* L.	Turkish hazel	Corylaceae	Male flowers and fruit	*Q.p.*	3	1	Mush, bread
Z313906	*Cotoneaster integerrimus* Medik.	Cotoneaster	Rosaceae	Fruit	*Q.p.*	N	N	Fresh fruit and beverage
Z313907	*Cotoneaster nebrodensis* (Guss.) Koch.	Cotoneaster	Rosaceae	Fruit	*Q.p.*	N	N	Fresh fruit and beverage
Z313908	*Crataegus laevigata* (Poir.) DC.	Midland hawthorn	Rosaceae	Fruit and leaves	*P.s.*	3	5	Fresh fruit and beverage
Z325405	*Dactylorhiza maculata* (L.) Soó	Heath spotted orchid	Orchidaceae	Tuber and flowers	*Ad.*	2	2	Mush, bread, salad
Z314915	*Daucus carota* L.	Wild carrot	Umbelliferae	Root, leaves, and seed	*Art.*	2	3	Condiment, cooked vegetable
Z311701	*Dictamnus albus* L.	Burning bush	Rutaceae	Leaves and flowers	*Q.p.*	2	3	Salad, condiment
Z101001	*Dryopteris filix-mas* (L.) Schott.	Common male-fern	Dryopteridaceae	Ground parts	*F., V.-P.*	2	4	Mush, bread
Z313201	*Epilobium angustifolium* L.	Rosebay willow-herb	Onagraceae	Young shoot	*E.a.*	3	2	Cooked vegetables
Z314906	*Eryngium amethystinum* L.	Sea holly blue	Umbelliferae	Ground part	*B.e.*	N	N	Salad and beverage
Z312102	*Fagus moesiaca* (K. Malý) Czeczott.	Moesian beech	Fagaceae	Young leaves, fruit, and young bark	*F.*	N	N	Mush, bread
Z313911	*Filipendula hexapetala* Gilib.	Dropwort	Rosaceae	Ground part and leaves	*B.e.*	2	1	Sweet, salad, bread
Z313912	*Fragaria elatior* Ehrh.	Hautbois strawberry	Rosaceae	Fruit and leaves	*E.a.*	3	0	Fresh fruit, Vitamin beverage
Z313913	*Fragaria vesca* L.	Wild strawberry	Rosaceae	Fruit and leaves	*E.a.*	3	3	Fresh fruit, Vitamin beverage
Z313102	***Fraxinus ornus* L.**	Manna ash	Oleaceae	Juice and flowers	*Q.p.*	3	3	Beverage, condiment
Z314301	*Galium odoratum* (L.) Scop.	Sweet woodruff	Rubiaceae	Aerial parts	*F.*	3	3	Fresh flower, condiment

Table 9.1 (continued)

Voucher specimen	Scientific name	English common name	Plant family	Part(s) used	Habitat/ community	Edibility rating	Medicinal rating	Preparation/use
Z313916	***Geum urbanum* L.**	Wood avens	Rosaceae	Root and leaves	*P.a., Gle.*	3	3	Salad, condiment
Z325405	*Gymnadenia conopsea* (L.) R.Br.	Fragrant orchid	Orchidaceae	Ground parts	*B.e., Arrh.*	2	2	Mush, bread, fresh flower
Z314909	*Heracleum sphondylium* L.	Cow parsnip	Umbelliferae	Root and young shoots	*Arrh.*	3	2	Cooked vegetables, condiment
Z312301	***Hypericum perforatum* L.**	St. John's wort	Gutiferae	Young shoots	*Orig., B.e.*	2	4	Condiment
Z325602	*Iris bosniaca* G. Beck.	Bosnian iris	Iridaceae	Ground parts	*Amph.*	N	N	Mush, bread
Z311701	*Jovibarba globifera* (L.) J. Parn. subsp. *hirta* (L.) J. Parn.	Mouse hen	Crassulaceae	Leaves	*Amph.*	N	N	Fresh salad and water
Z325801	*Juglans regia* L.	Walnut tree	Juglandaceae	Fruit	*P.a.*	4	3	Fruit
Z205901	*Juniperus communis* L.	Common juniper	Cupressaceae	Fruit	*Jun., V.-P.*	3	3	Beverage
Z312406	***Lamium maculatum* L.**	Spotted dead nettle	Labiatae	Young shoots	*O.*	N	N	Cooked vegetables, condiment
Z312407	*Lamium purpureum* L.	Purple dead-nettle	Labiatae	Young shoots	*Ch.*	2	1	Cooked vegetables, condiment
Z322612	*Lilium martagon* L.	Turk's cap lily	Liliaceae	Ground parts	*F.*	2	1	Mush, bread
Z311814	*Lunaria rediviva* L.	Perennial honesty	Cruciferae	Leaves	*Ad.*	2	0	Salad, cooked vegetables
K313942	*Malus sylvestris* Miller	Crab apple	Rosaceae	Fruit	*F., Q.p.*	3	2	Fresh fruit, beverage, "SIRCE"
Z312703	*Malva moschata* L.	Musk mallow	Malvaceae	Young shoots	*Arrh.*	5	2	Cooked vegetables
Z312409	*Melittis melissophyllum* L.	Bastard balm	Labiatae	Flowers and shoots	*Q.p.*	1	1	Nectar, Fresh flower, salad, condiment
Z312411	*Mentha arvensis* L.	Corn mint	Labiatae	Young shoots	*Ch.*	3	2	Condiment, tea
Z312410	***Mentha longifolia* (L.) Huds.**	Horsemint	Labiatae	Young shoots	*Bid.*	2	2	Condiment, tea
Z312412	***Mentha pulegium* L.**	Pennyroyal	Labiatae	Young shoots	*Bid.*	3	3	Condiment, tea

Table 9.1 (continued)

Voucher specimen	Scientific name	English common name	Plant family	Part(s) used	Habitat/ community	Edibility rating	Medicinal rating	Preparation/use
Z312002	*Mercurialis perennis* L.	Dog's mercury	Euphorbiaceae	Young shoots	*F.*	0	1	Cooked vegetables
Z312426	*Micromeria thymifolia* (Scop.) Fritsch.	Thyme savory	Labiatae	Aerial parts	*S.-Ch.*	N	N	Condiment, tea
Z311203	*Myosoton aquaticum* (L.) Mech.	Water chickweed	Caryophyllaceae	Whole plant	*M.-C.*	1	1	Fresh salad
Z314913	*Myrrhis odorata* (L.) Scop.	Sweet cicely	Umbelliferae	Leaves	*Ad.*	4	3	Fresh leaves, condiment
Z311811	***Nasturtium officinale* R. Br.**	Watercress	Cruciferae	Aerial parts	*M.-C.*	4	3	Fresh salad
Z314916	*Opopanax chironium* (L.) W.D.J. Koch	Opopanax	Umbelliferae	Leaves	*Q.p.*	N	N	Cooked vegetables, condiment
Z325404	***Orchis simia* Lam.**	Wild orchid	Orchidaceae	Ground part and flowers	*B.e., Arrh.*	N	N	Mush, bread, salad
Z312413	*Origanum vulgare* L.	Oregano	Labiatae	Young shoot and flowers	*Orig., Q.p.*	4	3	Condiment, tea
Z310503	***Ostrya carpinifolia* Scop.**	Hop hornbeam	Betulaceae	Flowers	*Q.p.*	0	0	Mush, bread
Z313301	*Oxalis acetosella* L.	Wood sorrel	Oxalidaceae	Leaves	*V.-P.*	3	2	Salad
Z315002	*Parietaria officinalis* L.	Pellitory of the wall	Urticaceae	Young shoots	*Ad.*	2	3	Cooked vegetables
Z314911	*Pastinaca sativa* L.	Wild parsnip	Umbelliferae	Root and young shoot	*Arrh.*	4	1	Cooked vegetables
Z311422	*Petasites albus* (L.) P. Gaertn., B. Meg. and Schreb.	Butterbur	Compositae	Young leaves	*Ad.*	2	1	Cooked vegetables
Z310806	*Phyteuma pseudorbiculare* Pant.	Rampion	Campanulaceae	Young shoot	*F., Q.p.*	N	N	Salad, cooked vegetables
Z310805	*Phyteuma spicatum* L.	Spiked rampion	Campanulaceae	Young shoot	*Ad.*	2	0	Cooked vegetables, salad
Z201103	*Picea abies* (L.) Karsten	Norway spruce	Pinaceae	Young leaves, resin	*V.-P.*	2	1	Fresh leaves, vitamin beverage

Table 9.1 (continued)

Voucher specimen	Scientific name	English common name	Plant family	Part(s) used	Habitat/ community	Edibility rating	Medicinal rating	Preparation/use
Z201106	*Picea omorika* (Pancic) Purk.	Pancic's spruce	Pinaceae	Young branches, and leaves	*V.-P.*	2	0	Fresh leaves, vitamin beverage
Z314912	*Pimpinella major*(L.) Huds.	Greater burnet saxifrage	Umbelliferae	Root and young shoot	*B.e.*	1	2	Cooked vegetables
Z201104	*Pinus nigra* J.F. Arnold	Austrian pine	Pinaceae	Young branches, leaves, and resin	*Amph., P.h.-n.*	1	2	Fresh leaves, vitamin beverage
Z325406	*Platanthera bifolia* (L.) Rchb.	Butterfly orchid	Orchidaceae	Ground part and flowers	*F., V.-P.*	2	1	Mush, bread, salad
Z313402	*Plantago lanceolata* L.	Ribwort plantain	Plantaginaceae	Aerial parts	*Arrh., Agr.*	2	3	Cooked vegetables
Z313403	*Plantago media* L.	Hoary plantain	Plantaginaceae	Aerial parts	*B.e.*	2	2	Cooked vegetables
Z313504	*Polygonum hydropiper* L.	Smartweed	Polygonaceae	Aerial parts	*Bid.*	2	2	Condiment, salad
Z103602	***Polypodium vulgare* L.**	Polypodi	Polypodiaceae	Ground part	*Amph.*	2	3	Mush, bread
Z010101	*Polystichum lonchitis* (L.) Roth	Holly fern	Aspidiaceae	Young leaves	*F.*	N	N	Fresh/vegetables
Z313801	*Primula columnae* Ten.	Cowslip	Primulaceae	Young leaves	*B.e., Cor.*	3	3	Fresh/salad
Z313803	***Primula vulgaris* Huds.**	Primrose	Primulaceae	Young leaves and flowers	*F., Arrh.*	3	3	Fresh/salad
Z313938	*Prunus avium* L.	Wild cherry	Rosaceae	Fruit	*F.*	4	2	Fresh fruit and beverage
Z313939	***Prunus mahaleb* L.**	Mahaleb cherry	Rosaceae	Fruit	*Q.p.*	3	1	Fresh fruit and beverage
Z106101	***Pteridium aquilinum* (L.) Kuhn**	Bracken	Dennstaedtiaceae	Young shoot	*Pter.*	2	2	Cooked vegetables
Z313922	*Prunus spinosa* L.	Sloe	Rosaceae	Fruit and leaves	*P.s.*	3	2	Fresh fruit and beverage
Z310601	*Pulmonaria officinalis* L.	Lungwort	Boraginaceae	Young shoot	*F.*	2	3	Cooked vegetables
Z313919	*Pyrus pyraster* Burgsd.	Common pear tree	Rosaceae	Fruit	*F.*	3	0	Fresh fruit and beverage
Z312103	***Quercus cerris* L.**	Turkey oak	Fagaceae	Fruit and bark	*Q.p.*	3	2	Mush, bread

Table 9.1 (continued)

Voucher specimen	Scientific name	English common name	Plant family	Part(s) used	Habitat/ community	Edibility rating	Medicinal rating	Preparation/use
Z312104	*Quercus frainetto* Ten.	Hungarian oak	Fagaceae	Fruit and bark	*Q.p.*	4	2	Mush, bread
Z312106	***Quercus petraea* (Matt.) Liebl.**	Sessile oak	Fagaceae	Fruit and bark	*F.*	2	3	Mush, bread
Z312107	***Quercus pubescens* Willd.**	Downy oak	Fagaceae	Fruit and bark	*Q.p.*	2	2	Mush, bread
Z312202	*Ribes petraeum* Wulfen	Rock red currant	Grossulariaceae	Fruit and leaves	*F.*	3	0	Fresh fruit and beverage
Z312203	*Ribes uva-crispa* L.	Gooseberry	Grossulariaceae	Fruit and leaves	*E.a.*	5	1	Fresh fruit and beverage
Z312510	*Robinia pseudacacia* L.	Black locust	Leguminosae	Flowers	*Rob.*	3	2	Sweet, salad
Z311813	*Rorippa sylvestris* (L.) Besser	Yellow cress	Cruciferae	Young shoot	*Agr.*	N	N	Cooked vegetables
Z313924	*Rosa arvensis* Huds.	Weedose	Rosaceae	Fruit	*P.s.*	2	3	Fresh fruit and beverage
Z313923	***Rosa canina* L.**	Dog-rose	Rosaceae	Fruit	*P.s.*	3	3	Fresh fruit and beverage
Z313926	*Rosa pendulina* L.	Alps rose	Rosaceae	Fruit	*Q.p., V.-P.*	N	N	Fresh fruit and beverage
Z313927	*Rubus caesius* L.	Dewberry	Rosaceae	Fruit and leaves	*S.p.*	2	0	Fresh fruit and beverage
Z313928	*Rubus hirtus* Waldst. and Kit.	Forest bramble	Rosaceae	Fruit and leaves	*V.-P.*	N	N	Fresh fruit and beverage
Z313929	*Rubus idaeus* L.	Raspberry	Rosaceae	Fruit and leaves	*E.a.*	5	3	Fresh fruit and beverage
Z313930	*Rubus plicatus* Waldst. and Kit.	Bramble	Rosaceae	Fruit and leaves	*P.s.*	N	N	Fresh fruit and beverage
Z313931	*Rubus saxatilis* L.	Stone bramble	Rosaceae	Fruit and leaves	*Q.p.*	2	1	Fresh fruit and beverage
Z313932	***Rubus tomentosus* Borkh.**	Silver bramble	Rosaceae	Fruit and leaves	*Q.p.*	N	N	Fresh fruit and beverage
Z313508	*Rumex acetosa* L.	Sorrel	Polygonaceae	Leaves	*Arrh.*	5	3	Salad and vegetables
Z313512	*Rumex patientia* L.	Herb patience	Polygonaceae	Leaves	*Agr.*	3	1	Salad and vegetables
Z312427	*Salvia glutinosa* L.	Jupiter's distaff	Labiatae	Young leaves and flowers	*F.*	1	0	Salad
Z312416	*Salvia pratensis* L.	Meadow clary	Labiatae	Young shoots	*B.e.*	1	0	Condiment, tea

Table 9.1 (continued)

Voucher specimen	Scientific name	English common name	Plant family	Part(s) used	Habitat/ community	Edibility rating	Medicinal rating	Preparation/use
Z311102	*Sambucus nigra* L.	Elderberry	Caprifoliaceae	Flowers and fruit	*F., S.a.*	4	3	Fresh fruit and beverage
Z311103	*Sambucus racemosa* L.	Red elder	Caprifoliaceae	Fruit	*Ad.*	3	2	Fresh fruit and beverage
Z313931	*Sanguisorba minor* Scop.	Salad burnet	Rosaceae	Aerial parts	*B.e.*	4	2	Fresh salad
Z312417	*Satureja montana* L.	Winter savory	Labiatae	Aerial parts	*S.-Ch.*	4	3	Condiment, tea
Z313001	*Saxifraga rotundifolia* L.	Round-leaved saxifrage	Saxifragaceae	Leaves	*F.*	N	N	Salad
Z311703	***Sedum hispanicum* L.**	White stonecrop	Crassulaceae	Aerial part	*S.-Ch.*	1	1	Salad and condiment
Z311704	*Sedum montanum* Perr. and Song.	Alpine stonecrop	Crassulaceae	Aerial part	*S.-Ch.*	N	N	Salad and condiment
Z311705	*Sedum telephium* L.	Orpine	Crassulaceae	Leaves	*Q.p.*	1	2	Salad, water
Z311202	***Silene vulgaris* (Moench) Garcke**	Bladder campion	Caryophyllaceae	Young shoots	*Arrh.*	2	1	Cooked vegetables
Z313933	*Sorbus mougeottii* Soy.-Will. and Godr.	White bean mountain Ash	Rosaceae	Fruit and leaves	*Q.p.*	N	N	Fresh fruit
Z315501	*Staphylea pinnata* L.	Bladder nut	Staphyleaceae	Seed	*Q.p.*	3	0	Mush, bread
Z310603	*Symphytum tuberosum* L.	Tuberous comfrey	Boraginaceae	Root and young shoots	*Bid.*	2	0	Cooked vegetables
Z326201	*Tamus communis* L.	Black bryony	Dioscoreaceae	Young shoots	*Q.p.*	1	2	Cooked vegetables
Z311423	***Taraxacum officinale* Weber**	Dandelion	Compositae	Leaves, root, and flowers	*Arrh.*	4	3	Fresh salad, cooked vegetables, sweet, coffee
Z311424	*Telekia speciosa* (Schreb.) Baumg.	Large yellow ox-eye	Compositae	Young shoots	*Ad.*	N	N	Cooked vegetables
Z312422	*Thymus balcanus* Borbas	Balkan thyme	Labiatae	Aerial parts	*B.e.*	N	N	Condiment, tea

Table 9.1 (continued)

Voucher specimen	Scientific name	English common name	Plant family	Part(s) used	Habitat/ community	Edibility rating	Medicinal rating	Preparation/use
Z312421	*Thymus pulegioides* L.	Broad-leaved thyme	Labiatae	Aerial parts	*B.e.*	2	2	Condiment, tea
Z314701	*Tilia cordata* Miller	Small-leaved lime	Tiliaceae	Flowers	*Q.p.*	5	3	Beverage, tea
Z314702	*Tilia tomentosa* Moech.	Silver lime	Tiliaceae	Flowers	*F., Q.p.*.	3	1	Beverage, tea
Z312515	*Trifolium pretense* L.	Red common clover	Leguminosae	Aerial parts	*Arrh.*	3	3	Fresh salad, vegetables
Z312514	*Trifolium rubens* L.	Red clover	Leguminosae	Aerial parts	*Orig.*	N	N	Salad
Z311423	***Tussilago farfara* L.**	Coltsfoot	Compositae	Leaves	*O.*	3	3	Cooked vegetables
Z315001	***Urtica dioica* L.**	Stinging nettle	Urticaceae	Young shoots	*O.*	5	5	Cooked vegetables
Z314401	***Veronica beccabunga* L.**	Brooklime	Scrophulariaceae	Young shoots	*Mol.*	1	1	Fresh salad, cooked vegetables, salad
Z311104	*Viburnum lantana* L.	Wayfaring tree	Caprifoliaceae	Fruit	*Q.p.*	1	0	Beverage
Z315201	*Viola reichenbachiana* Jord. ex Boreau	Common dog violet	Violaceae	Flowers	*P.s.*	2	2	Condiment and beverage

N new plant food species registered in this investigation *Ad. Adenostyletalia* (high herbaceous vegetation); *Agr. Agrostetalia* (hygrophilous nitric grasslands); *Amph. Amphoricarpetalia* (calcareous cliff vegetation); *Arrh. Arrhenatheretalia* (mesophyllous grasslands); *Art. Artemisietalia* (high herbaceous neglected vegetation); *B.e. Brometalia erecti* (thermophyllous calcareous grasslands); *Bid. Bidentetalia* (nitrogen-rich hygrophilous vegetation); *Ch. Chenopodietalia* (mesophyllous nitrogen-rich neglected vegetation); *E.a. Epilobietalia angustifoliae* (Rosebay Willow-herb); *F. Fagetalia* (mesophyllous deciduous forests); *Gle. Glechometalia* (semi neglected vegetation); *Jun. Juniperetalia* (Juniper scrubs); *Mol. Molinietalia* (hygrophilous grasslands); *M.-C. Montio-Cardaminetalia* (spring vegetation); *O. Onopordetalia* (neglected vegetation); *Orig. Origanetalia* (thermophyllous high herbaceous vegetation); *P.a. Populetalia albae* (hygrophilous forests); *P-h.-n* Pinetalia heldreichii-nigrae (black pine calcareous forests); *P.s. Prunetalia spinosae* (natural fens vegetation); *Ph. Phragmitetalia* (reed wetlands); *P. Pteridietalia* (bracken vegetation); *Rob. Robinietalia* (black locust vegetation); *S.-Ch. Scorzonero-Chrysopogonetalia* (rocky calcareous grasslands); *S.p. Salicetalia purpureae* (low willow scrubs)

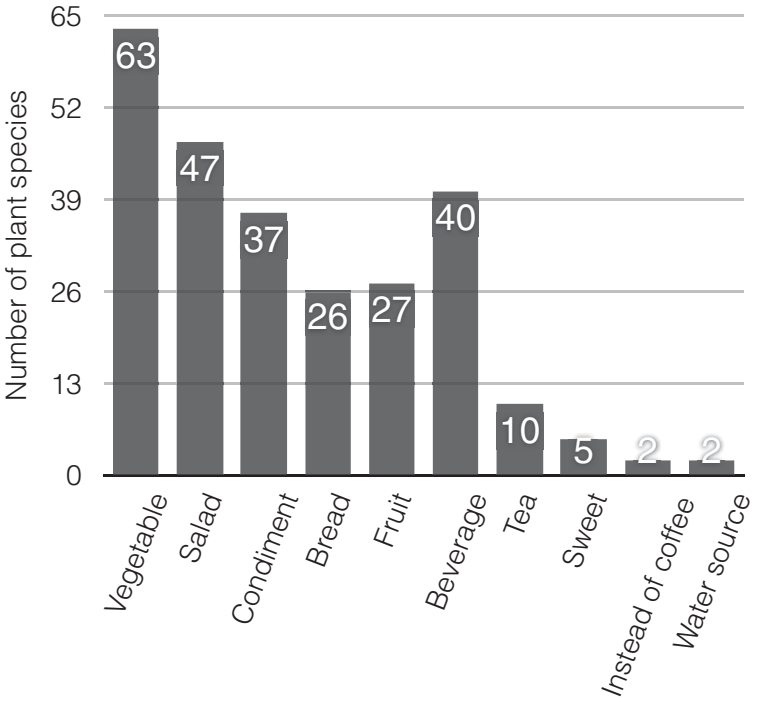

Fig. 9.2 The purpose of usage of edible plants

(47 species). Some were eaten fresh from the ground. Species from this category included: *Rumex acetosa, Oxalis acetosella, A. ursinum, Primula vulgaris, Primula columnae, N. officinale*, *T. officinale, Alchemilla hybrida, Sanguisorba minor, and Trifolium* spp. Many plants were used as spices (37 species). The most common species were: *A. ursinum, Origanum vulgare, Daucus carota, Galium odoratum, Hypericm perforatum, Mentha* spp., *Micromeria thymifolia, Polygonum hydropiper,* and *Thymus* spp. Most of these plants were also used in healthy and medicinal teas (see Fig. 9.2).

During food shortages, the lack of raw materials for bread was a major issue. However, 26 species from this region had underground parts, fruits, or catkins that were used as raw bread materials for producing mashes, bread supplements, and special cakes. From this group, the following species were important: *Quercus* spp., especially *Quercus frainetto, B. pendula, C. betulus, Corylus* spp., *F. moesiaca, Platanthera bifolia, Gymnadenia conopsea,* and some others (see Fig. 9.2).

The region was rich in wild fruit plants, producing fresh and processed fruit, as well as beverages. The beverages were simple preparations, made by steeping plant raw material in water (maceration) and heating it over low heat (decoction). As many as 67 species were identified from this category, the most significant included *Cotoneaster* spp., *Amelanchier* spp., *C. laevigata, Fragaria* spp., *Juniperus*

communis, Picea spp., *Pinus nigra, Pyrus* spp., *Prunus, Malus, Rosa,* and *Rubus,* from which jams, marmalade, and dried fruits could be made.

9.3.2.1 Substitutes for Coffee, Water, and Tobacco

The leaves of *Jovibarba globifera* and *Sedum* spp., as well as *O. acetosella* and *R. acetosa,* were used as water substitutes to alleviate thirst. The roots of *T. officinale, C. intybus,* and acorn of *Quercus* spp. were used as coffee substitutes, while the leaves of walnut, *J. regia,* coltsfoot, *T. farfara,* and blackthorn, *Prunus spinosa,* and stalks of *Clematis vitalba* were used as tobacco substitutes.

9.3.3 Food Storage and Preservation

Most species were eaten fresh and picked when needed. However, some were picked during their optimal phenophase and stored for longer-term use. Several methods were used to preserve edible wild plants; the most common are explained below.

Raw bread materials of tuberous plants, bulbs, roots, and bigger leafy plants were stored in shade, most often underground. Species preserved in this manner included *Heracleum sphondylium, Asphodelus albus, A. ursinum, Gymnadenia* sp., *Orchis* sp., *T. officinale, U. dioica,* and *T. farfara.*

Some aerial and underground plant parts were dried. Usually, the meaty underground parts were cut into smaller pieces to be dried by low heat for sun. Species preserved this way included: *A. millefolium, Hypericum perforatum,* species of genus *Mentha* than *M. thymifolia, Satureja montana, O. vulgare, Tilia* sp., and *Viola* sp.

Wild fruits were dried, mostly by sun or light fire. Fruits preserved this way included *Rosa* spp., *Cotoneaster* spp., *J. communis, C. laevigata,* and *P. spinosa.*

Plants were preserved in natural diluted vinegar. The meaty stalk, leaves, and underground parts of *Angelica sylvestris, Campanula* sp., *C. intybus,* and *E. angustifolium* were prepared this way.

Fresh wild fruits of *Malus* and *Pyrus* were preserved by mixing with blackthorn fruit, *P. spinosa,* and juniper, *J. communis*. In this way, fruit was preserved even during winter and provided a pleasant medicinal beverage, known as brine.

9.3.3.1 Plants Used for Meat Preservation

Preserving wild meat from fish, birds, snails, frogs, and some insects was challenging under the circumstances. These meats were used as a supplemental source of animal proteins and fats. Freshly caught fish and frog were preserved safely for several days by removing their entrails and stuffing them with fresh stalks of nettle *U. dioica, M. thymifolia, S. montana, Thymus* sp., *Mentha longifolia,* and some genera

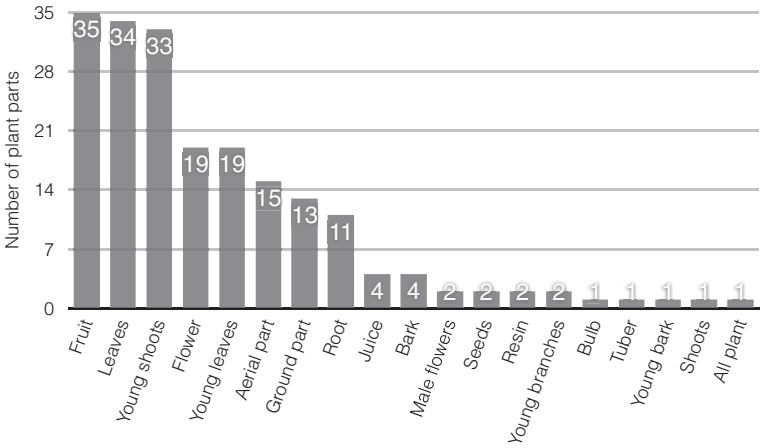

Fig. 9.3 Plant parts used for human nutrition

from the family Rosaceae, such as the fruits of *P. spinosa,* leaves of *A. millefolium,* and *Telekia speciosa*.

9.3.3.2 Parts Used

From the 147 plant species used as supplementary foods, 200 plant parts were used. These were classified into 19 groups (Fig. 9.3). Depending on the season, the most frequently used were young shoots (30%), fruits (22%), leaves, young twigs (12%), underground parts (15%), and flowers (7%). Underground parts were used less frequently.

9.3.3.3 Preparations

In different seasons, about 20 different categories of nutritious preparations were made from wild plants, including fresh salads, cooked stews, fresh wild fruits, prepared salads, cooked mash, breads, spices, beverages, and cooked fruit jam, as well as nutritious tea and coffee substitutes (Fig. 9.4). From 147 plants, as many as 278 preparations were made, because many species of plants and their various parts were used more than once as different meals and preparations (see Fig. 9.4).

9.3.4 Edibility Rating

The registered plant nutritional values of most species were determined to have medium nutritional values (Fig. 9.5) by comparison to the international database *Plants for the Future* (PFAF 2012). However, under the wartime circumstances, their value was sufficient to meet basic vitamin and fiber requirements. Only 12 of

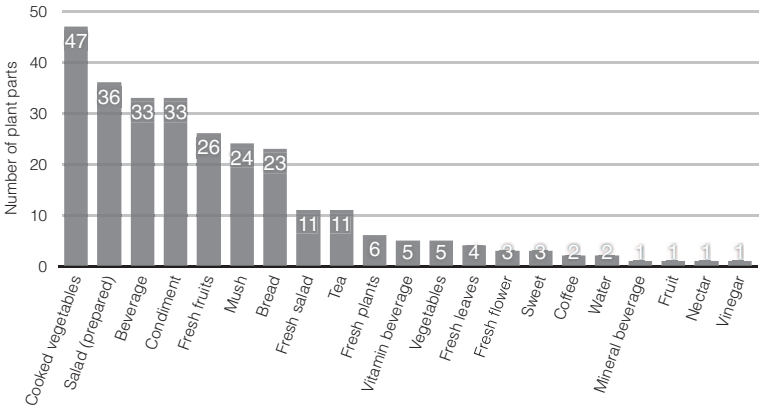

Fig. 9.4 Methods of food preparation

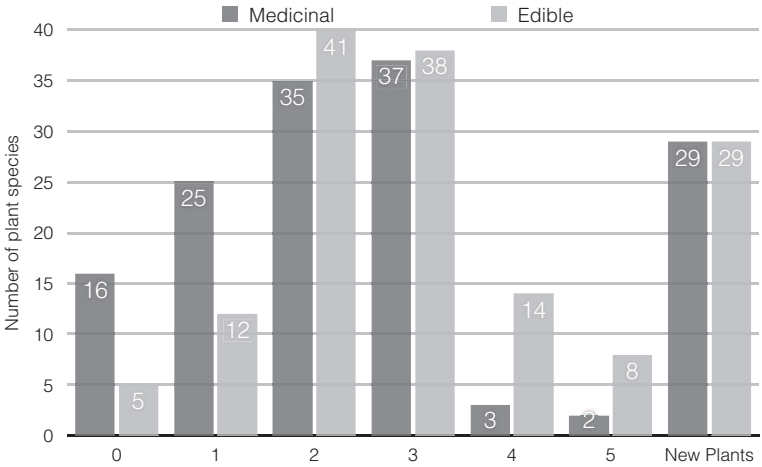

Fig. 9.5 Edibility and medicinal ratings of wild plants

the cited species had low nutritional values and only five species, according to the database, had no nutritional value: *Asplenium scolopendrium, Astrantia major, C. betulus, O. carpinifolia,* and *Mercurialis perennis*. However, the young plants of *M. perennis* are used in a traditional stew in Croatia (Grlić 1980), while *A. scolopendrium* has been recognized as an important medicinal plant (Imran et al. 2007; Redžić 2007, 2009b, 2010b). The catkins of *C. betulus* and *O. carpinifolia,* of the Betulaceae family, share many nutritional similarities with other species from this family, such as birch, *B. pendula* with an edibility rating of 3. *A. major* from the Apiaceae family might serve as a spice in normal circumstances due to its pleasant odor. However, more detailed nutritional research of these plants is required to determine their actual nutritional status, since the Betulaceae species were important as supplementary raw bread materials.

In total, 22 plants, 15%, had high nutritional values (see Fig. 9.5), including some popular foods: *U. dioica, A. ursinum, T. officinale, R. acetosa, S. nigra, N. officinale, Ribes uva-crispa, Corylus avellana,* and *Q. frainetto*. However, some species with high edibility ratings were relatively unknown and not used greatly, including: *Campanula glomerata, Malva moschata, Myrrhis odorata,* and *S. minor*. Conversely, some species that were regarded as safe and healthy were found to have relatively low edibility ratings, including: *C. acaulis, Dactylorhiza maculata, E. angustifolium, Filipendula hexapetala, Lilium martagon, Phyteuma spicatum, P. abies, Pteridium aquilinum,* and *Tamus communis*. This indicates that traditional food habits and beliefs were often more important than actual nutritional value.

Wild plant species with no entry in the international database attracted the most attention, as this was the first time they were identified for their use in the human diet. This research recorded 29, 20%, new wild plant species in the database of edible wild plants. This high percentage was surprising, not only because of their nutritional values but also because there are typically limited opportunities to find nutritional plants in critical situations. Therefore, this research indicates new possibilities to investigate a wild plant resource for human consumption. The following species are especially noteworthy, of which some are also endemic: *A. hybrida, C. trachelium, F. moesiaca, Eryngium amethystinum, M. thymifolia, Opopanax chironium, Rosa pendulina, Rubus hirtus,* and *T. speciosa*.

Many registered edible plants had high medicinal values (see Fig. 9.5). According to PFAF, 16 species had no medicinal value while around 70 species (50%) had medium medicinal values, rated 2 and 3. Five species had very high medicinal values. Some plants in the study area have a long tradition in ethnobotany and ethnopharmacology, including the species *A. millefolium* and *H. perforatum,* the fruit plant *C. laevigata,* and the leafy vegetables *Dryopteris filix-mas* and *U. dioica.*

9.3.5 Taxonomy of Wild Edible Plants

The identified plant species belong to 47 plant families (Fig. 9.6). The most widespread were Rosaceae (17.69%), Lamiaceae (9.52%), Asteraceae (8.16%), Apiaceae (6.81%), and Campanulaceae (4.08%). Representatives of other families are listed in Fig. 9.6. The scope of the edible plant taxonomy departs significantly from the scope of edible wild plants of the entire B&H territory (Redžić 2006). There were correlations and links between the taxonomic classification of identified plants and usable parts. Plants with parts used as wild fruits and salads belonged mainly to Asteraceae, wild fruits belonged to Rosaceae, bread substitute plants belonged to Liliaceae and Betulaceae, and spices belonged to Lamiaceae, Apiaceae, Polygonaceae, and others. Specificity and uniqueness were pronounced in the frequent use of species of Campanulaceae (>4%). Many well-established edible wild plants were missing from the list of identified plants, including species of Chenopodiaceae and Polygonaceae that grew in the wider research area. This could have been because the plants from these families mainly grew around human settlements and in arable

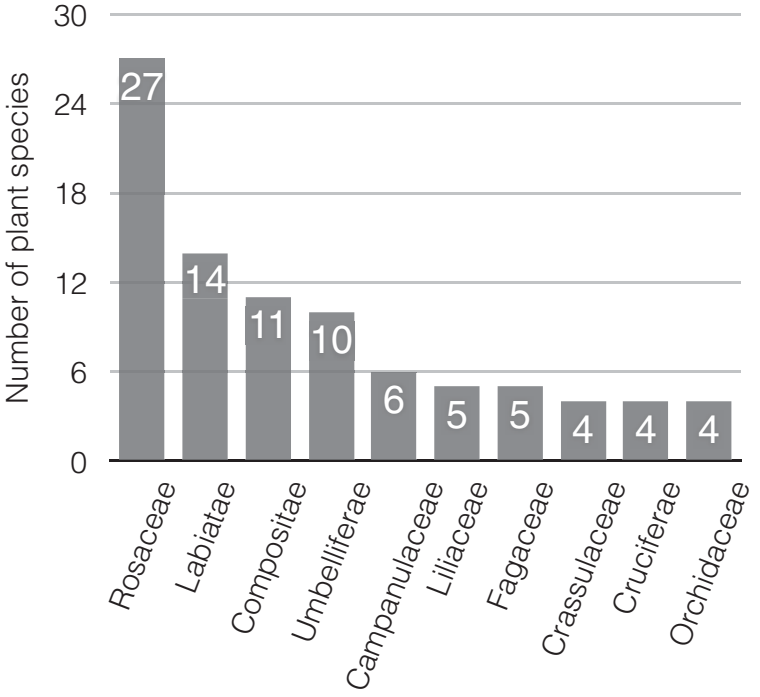

Fig. 9.6 The ten most frequent families of identified plants

or ruderal habitats, which were inaccessible to the isolated population during the war. The main factors that lead to the use of wild plants despite inexperience with these plants were survival and fear of hunger and diseases due to malnutrition, including: *Arctium nemorosum, Campanula* spp., *E. amethystinum, T. speciosa,* and *Staphylea pinnata* (see Table 9.1).

9.3.6 Ecological Distribution

The edible wild plants grew in 24 different plant habitats that, in terms of ecology and plant community, belonged to different vegetation orders (Table 9.2). The most frequent species were broadleaved species of deciduous forests of the order *Quercetalia pubescentis* (17.69%), mesophyllous beech forests (17.04%), dry meadows of the order *Bometalia erecti* (9.52%), and mesophyllous meadows of the order *Arrhenatheretalia* (8.16%). An overview of the vegetation orders is listed in Table 9.2. These relationships were conditioned by the domination of the aforementioned forests (Fig. 9.7). Most of these forests were remotely located, such as in the Drina river canyon. These habitats were rich in wild plants year round. In addition, certain

Table 9.2 Ecology and habitats of wild plants implicated in human nutrition

No	Habitat/community	Number of species	Proportion (%)
1	*Quercetalia pubescentis*	25	17.01
2	*Fagetalia*	25	17.01
3	*Brometalia erecti*	13	8.84
4	*Arrhenatheretalia*	13	8.84
5	*Adenostyletalia*	11	7.48
6	*Prunetalia spinosae*	8	5.44
7	*Onopordetalia*	6	4.08
8	*Vaccinio-Piceetalia*	5	3.40
9	*Scorzonero-Chrysopogonetalia*	5	3.40
10	*Epilobietalia angustifoliae*	5	3.40
11	*Chenopodietalia*	4	2.72
12	*Bidentetalia*	4	2.72
13	*Origanetalia*	3	2.04
14	*Molinietalia*	3	2.04
15	*Amphoricarpetalia*	3	2.04
16	*Populetalia albae*	2	1.36
17	*Montio-Cardaminetalia*	2	1.36
18	*Artemisietalia*	2	1.36
19	*Agrostetalia albae*	2	1.36
20	*Salicetalia purpureae*	1	0.68
21	*Robinietalia*	1	0.68
22	*Pteridietalia*	1	0.68
23	*Pinetalia heldreichii-nigrae*	1	0.68
24	*Phragmitetalia*	1	0.68
25	*Juniperetalia*	1	0.68
	Total	147	100

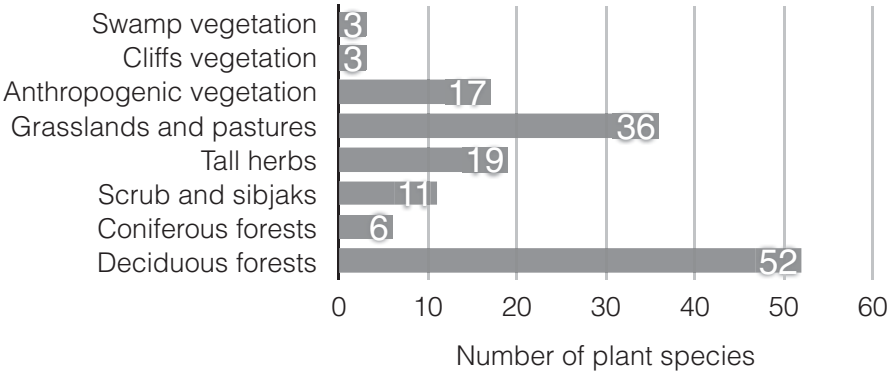

Fig. 9.7 The main vegetation type in which identified plants were found

conserved places were inhabited by natural gardens of bear's garlic, *A. ursinum,* one of most popular edible plants. Bear's garlic was such an important component of civilian and soldier diets that there were plans to create a monument in its honor. Moreover, plants that inhabited the crevices of the rocks and scree were important,

including specimens of the genera *Sedum* and *Jovibarba*. Soldiers used the shoots to ease their thirst throughout summer while they lived in inaccessible caves.

9.3.7 Seasonal Distribution

Since Podrinje has a temperate continental ecoclimate, with maritime influences from the south and the continental climate to the north, many plants survive in this area year round. Based on climatic variations, from cold, humid winters to warm, arid summers, there are four distinguishable seasons: spring, summer, autumn, and winter. The dominant plants are perennial herbaceous plants, trees, and brushwood. In winter, all trees except conifers lose their leaves and go dormant. Some plants are available all year to serve as a food source. This is important in winter, when there is less food available, but an increased need for food. *C. avellana* catkins are valuable winter foods, as they blossom at the end of autumn and maintain their nutritious male flowers until early spring in March. *N. officinale* grows green shoots in cold water all year. Also, needles and young twigs of *P. abies, P. omorika*, and *P. nigra* are also important. In dry winters, *Alisma plantago-aquatica* grows near water. Forests are rich with acorns of the genus *Quercus* and beech *F. moesiaca*. In addition, brackens of *P. aquilinum* were found near tree trunks with *O. acetosella* and *P. vulgaris* until early spring to the end of February. Then, the first shoots of nettle, *U. dioica,* dandelion, *T. officinale,* catkins of *B. pendula,* and the first leaves of beech, *F. moesiaca,* the favored shepherd's food, begin growing. Many plants begin their annual growth in spring and reach their maximum in early summer, through to autumn, when the fruits of forest from Rosaceae dominate.

9.4 Discussion

Most research conducted during a war on diet, chronic food shortages, and natural disasters has shown that nutrition is a primary concern for survival. Experiences in isolated areas during the Bosnian war have demonstrated that food is an important selection factor. Pronounced selfishness towards food is common, even between close relatives (Redžić 1993, 2010a). In the early stages of food shortage, most people are supportive and willing to share. However, as food shortages prolong, alienation appears and gradually increases. When conventional food resources run out or food must be rationed, people are compelled to find new food resources in their immediate vicinity to survive.

Plants and, less frequently, animals were the first source of nutrition. As hunger and fear of hunger increased, a decline in traditional food prejudices was observed. This contradicted behavior observed during the First and Second World Wars in the same region, where people died of starvation rather than consuming alternative food sources, such as wild plants, fungi, or animals, including frogs, snakes, lizards, grasshoppers, hedgehogs, and snails.

During the Bosnian war, people we interviewed began to include wild plants in their diet. At first, people used plants from their immediate environment. Later, they included forest and meadow plants. Wild plant use increased especially after the enemy took over the enclave. Most residents were forced to leave and form isolated guerrilla groups hidden in the forests and cliffs. Lacking conventional food, they ate wild plants and animals. In total, 147 species of wild plants were included to their diet. This high number illustrates the change in the relationship between humans and nature. Although a significant number of plant species have been used in the other areas studied (Becker 1983; Bonet and Vallès 2002; Addis et al. 2005), the experiences of the Žepa population have revealed new species not previously used for nutrition. Comparing the data to the global database (GRIN USDA 2008; PFAF 2012) and experiences from other regions, 29 new edible species have been discovered, representing significant resources of edible wild flora. We found a high degree of ingenuity in terms of the use of wild plants. There were 259 different preparation methods from the 147 wild plant species identified, significantly more than observed from other areas, even during peaceful periods (Cerne 1992; Ju 2000; Saidov 2001; Kaluski et al 2005; Salerno et al. 2005; Michael et al. 2006). Aerial plant parts were used more than underground parts, as they were more accessible.

Many informants thought that the main criteria for use of lesser known species were for the (1) ease of access and (2) morphological similarity to known edible plants. This illustrated a natural human instinct for survival relating to discovering sources of food. Plant species of open habitats, including meadows, arable land, tracks, and trails, were used less frequently. Although many edible plants grow in these habitats, they were inaccessible due to enemy pressure and snipers. Similar relationships with the ecological origin of edible plants have been defined in other parts of B&H (Redžić 2006, 2010a).

The wild edible plants identified as food by the Žepa population have significant nutritional values. Many contain basic nutritional substances, such as proteins, lipids, carbohydrates, vitamin C, and carotenoids. Compared to the nutritional values of the most popular edible wild plants in Croatia (Grlić 1980), those used as sustenance by the besieged population, in Sarajevo, B&H, from April 1992 to December 1995 (Redžić 1993) had high nutritional values (Table 9.3; Vračarić 1977; Redžić 1993). Plants especially rich in proteins included: *B. pendula, U. dioica, Rumex crispus, C. album, E. angustifolium, H. sphondylium, C. avellana*, *Lamium purpureum,* and *Pulmonaria officinalis*. Carbohydrate-rich plants included Rosaceae fruit, in particular from *Pyrus, Malus, Prunus,* and *Rosa* species and the roots, bulbs, and rootstocks from *L. martagon, T. officinale, P. spicatum, Quercus petraea,* and *C. avellana* (see Table 9.3). Obtaining sufficient dietary lipids can be difficult when foraging for plants as food. However, there were several plants among the identified species that contained sufficient quantities of lipids to alleviate deficiencies, although they did not provide optimal quantities. For example, 100 g of birch leaves, *B. pendula,* contain about 3.16 g of lipids. Wild fruits of *Rosa* spp. and apples, *M. sylvestris,* as well as leaves of *E. angustifolium* also contain a lot of lipids. Moreover, most wild plants are rich in various vitamins, minerals, and other nutritive compounds (Grlić 1952, 1980; Cook et al. 1998; Grivetti and Ogle 2000;

Table 9.3 Nutritive and caloric values of selected wild edible plants from the central and western Balkans (Vračarić 1977; Grlić 1980; Redžić 2010a, b)

Scientific name	Part of plant	Proteins (g/100 g plant material)	Fats (g/100 g plant material)	Carbohydrates (g)/100 g plant material	Calories/100 g plant material	Vitamin C (mg/100 g plant material)	Carotene (mg/100 g plant material)
Pteridium aquilinum	Young shoots	3.85	0.39	4.52	33	22	0.2
Betula pendula	Leaf	4.74	3.16	7.77	72	137	3.68
Urtica dioica	Leaf	5.75	0.92	6.01	50	105	5.59
Rumex crispus	Leaf	4.57	0.64	6.08	44	123	6.31
Polygonum persicaria	Leaf	3.97	1.02	10.7	64	78	4.96
Polygonum hydropiper	Young shoots	2.89	0.63	9.43	53	64	2.69
Chenopodium album	Leaf	4.09	0.65	3.73	33	80	4.47
Myosoton aquaticus	Aerial part	2.17	0.57	3.08	24	37	1.55
Silene vulgaris	Leaf	3.94	0.77	4.91	38	32	4.16
Malva silvestris	Leaf	6.7	1.4	7.03	61	140	10.22
Oxalis acetosella	Leaf	2.23	1.16	7.25	46	59	2.66
Sempervivum glaucum	Leaf	0.52	0.28	4.52	22	18	0.1
Rubus hirtus	Fruit	1.2	1.52	8.92	49	99	6.35
Potentilla anserina	Leaf	4.1	1.29	1.53	70	114	4.95
Rosa arvensis	Fruit	2.78	2.06	27.44	125	219	0
Rosa sempervirens	Fruit	2.49	2.13	33.8	148	135	7.25
Sorbus aria	Fruit	1.74	1.38	27.1	115	37	0
Pyrus pyraster	Fruit	0.78	0.79	20.64	84	7	0
Prunus spinosa	Fruit	1.27	1.04	24.54	101	37	0
Robinia pseudoacacia	Flower	4.64	0.71	10.45	62	39	0
Trifolium pratense	Leaf	5.12	1.18	6.89	53	135	11
Epilobium angustifolium	Leaf	5.43	1.18	10.39	68	98	5.92
Heracleum sphondylium	Leaf	5.31	0.95	6.42	50	105	3.25
Daucus carota	Root	1.26	1.29	12.96	65	10	0
Primula vulgaris	Leaf	1.92	0.8	7.84	44	305	2.75
Primula veris	Leaf	2.76	0.89	8.37	49	418	3.06
Pulmonaria officinalis	Leaf	3.74	0,9	5.94	43	28	3.95

Table 9.3 (continued)

Scientific name	Part of plant	Proteins (g/100 g plant material)	Fats (g/100 g plant material)	Carbohydrates (g)/100 g plant material	Calories/100 g plant material	Vitamin C (mg/100 g plant material)	Carotene (mg/100 g plant material)
Lamium purpureum	Leaf	4.15	0.98	7.28	50	35	5.37
Plantago lanceolata	Leaf	2.6	0.82	8.03	47	50	4.16
Campanula rapunculus	Leaf	2.96	0.88	5.31	38	107	4.89
Campanula trachelium	Leaf	4.66	0.95	7.15	51	94	6.43
Phyteuma spicatum	Root	0.54	0.29	18.04	76	12	0
Phyteuma spicatum	Leaf	3.2	1.02	6.06	43	135	7.09
Phyteuma orbiculare	Leaf	2.8	1.12	5.23	39	164	7.16
Taraxacum officinale	Root	2.15	0.34	18.63	84	No data	No data
Taraxacum officinale	Leaf	2.73	0.59	4.28	31	33	5.32
Cichorium intybus	Leaf	2.91	0.86	5.7	39	54	4.03
Alisma plantago-aquatica	Root	2.23	1.07	12.18	64	48	5.38
Asphodelus albus	Tuber	0.88	0.26	12.64	55	13	0
Allium ursinum	Leaf	1.99	0.86	3.5	27	45	4.78
Allium ursinum	Bulb	2.15	0.16	15.75	71	16	0
Lilium martagon	Bulb	1.59	0.24	24.2	103	11	0
Dactylorhiza maculata	Tuber	0.88	0.2	14.96	64	9	0
Gymnadenia conopsea	Tuber	0.63	0.18	8.05	36	10	0
Platanthera bifolia	Tuber	1.16	0.15	12,26	54	9	0
Malus sylvestris	Fruit	0.63	1.66	16.91	77	18	0
Quercus petraea	Fruit	3.28	0.44	20.62	89	No data	No data
Corylus avellana	Male flower	4.77	0.83	24.14	118	80	0

Trichopoulou et al. 2000; Fleischhauer 2003; Turan et al. 2003; Pardo de Santayana et al. 2005; Redžić S 2006; Aberoumand and Deokule 2009; Borah et al. 2009; Redžić 2010a).

The plants in the study area were high in vitamin C and carotenoids, both important antioxidants (Redžić et al. 2005, 2009a, c; Glew et al. 2005a, b). Vitamin C-rich plants from the region included: *P. vulgaris, Primula veris, P. spicatum, Rosa arvensis, Rosa sempervirens, Malva silvestris, R. crispus, B. pendula, Trifolium pretense, H. sphondylium,* and *E. angustifolium*. Carotenoid-rich plants included *M. silvestris* with 10.22 mg/100 g of plant matter, *Rosa* spp., *R. hirtus, C. album, Polygonum persicaria, P. spicatum,* and *A. ursinum*.

In addition, the wild plants from the study area had high caloric values. The most calorie-dense foods included fruits of Rosaceae species, including *Rosa, Sorbus, Prunus* and *Pyrus* spp., *C. avellana* catkins, the bulb lily, *L. martagon,* dandelion root, *T. officinale,* and wild apple fruits, *M. sylvestris* (see Table 9.3). Survival was possible in part due to the relatively high caloric value of the majority of the identified wild plants. These plants were especially important for the soldiers in hiding who survived almost entirely on wild flora and fauna for at least 3 months. Major malnutrition was prevented, which has occurred frequently in similar post-conflict situations characterized by food shortages (Guggenheim 1982; Rossi et al. 2006). Malnutrition can lead to diseases of the immune system (Griekspoor et al. 2004), reproduction complications (Wynn and Wynn 1993; Guha-Sapir and Panhuis 2004), diabetes mellitus (Marble 1949; Goto et al. 1958), hunger diseases (Shasha 2002; Herschlag-Elkayam et al. 2003), and other conditions (Lockett et al. 2000; Barnes and Almasy 2005; Rossi et al. 2005; Mittal and Srivastava 2006; Rossi et al. 2006; Volpato et al. 2009).

The importance of wild edible flora to the survival of the population in Podrinje, B&H, is supported by malnutrition data for the populations of Sarajevo and other areas of B&H that had no access to healthful wild plants during the siege (Redžić 2010a). Vespa and Watson (1995) found a decrease in the BMI of the populations of Sarajevo and two other major cities, Tuzla and Zenica. Life was particularly difficult from 1993 to 1994 when malnutrition was identified across all age groups (Watson et al. 1995; Watson and Vespa 1995).

Insufficient food quantity and variation affected the nutrition status of the besieged population of Sarajevo. Inhabitants could not meet their daily calorie requirements with the food available (Smaijkić et al. 1995). The average calories required for adults in this climate was 2700 kcal/day, while needs were likely higher for soldiers. Given the nutritional diversity of wild plants, the besieged Žepa population survived with no major health implications, even in winter, as some vitamin-rich species such as conifers *P. abies* and *P. omorika,* the water plant *N. officinale,* and *C. avellana* catkins were available, which were used as a substitute for flour.

Circumstances that promote insufficient and inadequate nutrition, including war, lead to dietetic status changes, especially in children and the elderly, and a decrease in body weight and BMI (Angell-Andersen et al 2004; Salehi et al. 2005; Laska-Mierzejewska and Olszewska 2007). However, use of edible wild plants can prevent this.

9.5 Conclusion

This research revealed original methods on the use of wild edible plants by humans when conventional food is not available due to war or isolation. Valuable knowledge on wild flora usage was gained. In total, 30 of the plant species identified here were recorded as used in the human diet for the first time. This study also revealed new methods of plant preservation and preparation for human consumption.

Food shortages lead to drastic changes in food habits. During the Bosnian war, people ignored traditional food fears and prejudices to survive, and began to consume different wild fruits, vegetables, and supplementary raw bread materials. This study has highlighted food as a deciding factor in human survival, demonstrated by people's distinctive behavior, expressed through their egoistic and altruistic attitudes.

References

Aberoumand A, Deokule SS (2009) Determination of elements profile of some wild edible plants. Food Anal Methods 2(2):116–119

ACC/SNC (1992) Second report on the world nutrition situation. Global and regional results. United Nations Agency of the CC/SCN.ACC/SNC, Geneva

Addis G, Urga K, Dikasso D (2005) Ethnobotanical study of edible wild plants in some selected districts of Ethiopia. Hum Ecol 33(1):83–118

Agrahar-Murugkar A, Subbulakshmi G (2005) Nutritive values of wild edible fruits, berries, nuts, roots, and species consumed by the Khasi tribes of India. Ecol Food Nutr 44(3):207–223

Angell-Andersen E, Tretli S, Bjerknes R, Forsén T, Sørensen TIA, Eriksson JG, Räsänen L, Grotmol T (2004) The association between nutritional conditions during World War II and childhood anthropometric variables in the Nordic countries. Ann Hum Biol 31(3):342–355

Bakić J, Skare-Krvarić M (1967) Wild flora and fauna in Adriatic region, as a natural reserve of food. Pomor Zb 5:791–829

Bakota M (1967) Improvement of nutrition by products of wildlife in Adriatic region. Hrana Ishr 8(3–4):194–200

Barnes DM, Almasy N (2005) Refugees' perceptions of healthy behaviors. J Immigr Health 7(3):185–193

Beck-Mannagetta G, Malý0 K, Bjelčić Ž (1983) Flora Bosnae et Hercegovinae. IV Sympetalae Pars 4, National Museum in Sarajevo. Special Edition, Book 4, Sarajevo

Becker B (1983) The contribution of wild plants to human nutrition in the Ferlo (Northern Senegal). Agrofor Syst 1:257–267

Blomhoff R (1991) Vitamin A metabolism: new perspectives on absorption, transport, and storage. Physiol Rev 71:951–990

Bonet MA, Vallès J (2002) Use non-crop food vascular plants in Montseny biosphere reserve (Catalonia, Iberian Peninsula). Int J Food Sci Nutr 53(3):225–248

Borah S, Baruah AM, Das AK, Borah J (2009) Determination of mineral content in commonly consumed leafy vegetables. Food Anal Methods 2(3):226–230

Braun-Blanguet J (1964) Pflanzensoziologie. Vienna, Springer, New York

Bussmann RW, Gilbreath GG, Solio J, Lutura M, Lutuluo R, Kunguru K, Wood N, Mathenge SG (2006) Traditional medicinal plant use in Northern Peru: tracking two thousand years of healing culture. J Ethnobiol Ethnomed 5(2):22–40

CBD (Convention on Biological Diversity) (2005) Report of the consultation on the cross-cutting initiative on Biodiversity for Food and Nutrition, Brasilia. http://www.biodiv.org/doc/meetings/agr/ibfn-01/official/ibfn-01-03-en.doc. Accessed 13 Feb 2008
Cerne M (1992) Wild plants from Slovenia used as vegetables. Acta Hortic 318:87
Čolić-Barić I, Kajfez R, Satalić Z, Cvjetić S (2004) Comparison of dietary habits in the urban and rural Croatian schoolchildren. Eur J Nutr 43(3):169–174
Cook JA, VanderJagt DJ, Dasgupta A, Mounkaila G, Glew RS, Blackwell W, Glew RH (1998) Use of the trolox assay to estimate the antioxidant content of seventeen edible wild plants of Niger. Life Sci 63(2):105–110
Cruz-Garcia GS (2006) The mother-child nexus. Knowledge and valuation of wild food plants in Wayanad, Western Ghats, India. J Ethnobiol Ethnomed 2:39–44
Dayton Agreement (1995) The General Framework Agreement for Peace in Bosnia and Herzegovina initialed in Dayton on 21 November 1995 and signed in Paris on 14 December 1995. http://www.hrt.hr/arhiv/dokumenti/dok/general.html. Accessed 31 Jul 2007
De Souza RG (2006) Body size and growth: the significance of chronic malnutrition among the Casiguran Agta. Ann Hum Biol 33(5–6):604–619
Ertug F (2004) Wild Edible Plants of the Bodrum Area (Mugla, Turkey). Turk J Bot 28:161–174
Euro Med (2005) The Euro + Med Plant base—the information resource for Euro-Mediterranean plant diversity. http://ww2.bgbm.org/EuroPlusMed/quer. Accessed 15 Jul 2008
FAO/WHO (2002) Human vitamin and mineral requirements. Report of a joint FAO/WHO expert consultation Bangkok, Thailand. World health organization and Food and Agriculture Organization of the United Nations, Rome
Fleischhauer SG (2003) Enzyklopädie der essbaren Wildpflanzen. AT, Aarau-Müchen
Freiberger CE, Vanderjagt DJ, Pastuszyn A, Glew RS, Mounkaila G, Millson M, Glew RH (1998) Nutrient content of the edible leaves of seven wild plants from Niger. Plant Foods Hum Nutr 53(1):57–69
Garnier D, Simondon KB, Hoarau T (2003) Public Health Nutr 6:535
Gillespie C, Cousins J, Pelham P (2002) European gastronomy into the 21st century. Food Serv Technol 2(2):107
Glew RS, Vanderjagt DJ, Bosse R, Huang YS, Chuang LT, Glew RH (2005a) The nutrient content of three edible plants of the Republic of Niger. J Food Compos Anal 18(1):15–27
Glew RS, Vanderjagt DJ, Chuang. LT, Huang YS, Millson M, Glew RH (2005b) Nutrient content of four edible wild plants from West Africa. Plant Foods Hum Nutr 60(4):187–193
Goto Y, Nakayama Y, Yagi T (1958) Influence of the World War II food shortage on the incidence of diabetes mellitus in Japan. Diabetes 7(2):133–135
Grlić LJ (1952) About vitamin values of our wild growing edible plants. Acta Pharm Yug 2:112–123
Grlić LJ (1980) Wild growing edible plants. Education, Zagreb (Samoniklo jestivo bilje. Prosvjeta, Zagreb)
Griekspoor A (2008), Spiegel P, Aldis W, Harvey P (2004) The health sector gap in the southern African crisis in 2002/2003. Disasters 28(4):388–404
GRIN USDA (2008), ARS, National Genetic Resources Program, Germplasm Resources Information Network, National Germplasm Resources Laboratory, Beltsville, MD. http://www.ars-grin.gov/cgi-bin/npgs/html/genform.pl. Accessed 30 May 2008
Grivetti LE, Ogle BM (2000) Value of traditional foods in meeting macro- and micronutrient needs: the wild plant connection. Nutr Res Rev 13:31–46
Guarrera M (2003) Food medicine and minor nourishment in the folk traditions of Central Italy (Marche, Abruzzo and Latium). Fitoterapia 74:515–544
Guggenheim IK (1982) The hunger investigators of the Warsaw ghetto. Harefuah 103(9):221
Guha-Sapir D, Panhuis WG (2004) Conflict-related mortality: an analysis of 37 datasets. Disasters 28(4):418–428
Guil JL, Rodríguez-Garcí I, Torija E (1997) Nutrition and toxic factors in selected wild edible plants. Plant Foods Hum Nutr 51:99–107
Guil Guerrero LJ, Gimenez Martinez JJ, Torija Isasa MEJ (1998) Mineral nutrient composition of edible wild plants. Food Compost Anal 11(4):322–328

Hanazaki N, Tamashiro YT, Leitao-Filho HF, Begossi A (2000) Diversity of plant uses in two Caicara communities from the Atlantic Forest coast, Brazil. Biodivers Conserv 9:597–615
Hercshlag-Elkayam O, Even L, Shasha SM (2003) Clinical manifestations of "hunger disease" among children in the ghettos during the Holocaust. Harefuah 142(5):345–349
Herdt RW (2004) CRC Crit Rev Plant Sci 23:505
Hidden Harvest (2014) Ottawa trees to tables | public trees for public good. http://treestotables.hiddenharvest.ca/. Accessed 20 Feb 2014
Huxley RR, Lloyd BB, Goldacre M, Neil H (2000) Nutritional research in World War 2: The Oxford Nutrition Survey and its research potential 50 years later. Br J Nutr 84(2):247–251
Imran M, Talpur FN, Jan MI, Khan A, Khan I (2007) Analysis of nutritional components of some wild edible plants. J Chem Soc Pak 29(5):500
Josifović M (Ed) (1989) Medicinal plants of Serbia. Serbian Academy of Science and Arts. Book DXCVIII. Dept. of Natural and Mathematical Sciences, book 65, Belgrade
Ju JS (2000) Nutrition in the Republic of Korea. Br J Nutr. 84(S2):S195–S198
Kristensen M, Balslev H (2003) Perceptions, use and availability of woody plants among the Gourounsi in Burkina Faso. Biodivers Conserv 12(8):1715–1739
Lacuna-Richman C (2006) The use of non-wood forest products by migrants in a new settlement: experiences of a Visayan community in Palawan, Philippines. J Ethnobiol Ethnomed 2:36–49
Ladio AH, Lozada M (2001) Nontimber forest product use in two human populations from Northwestern Patagonia: a quantitative approach. Hum Ecol 29:367–380
Laska-Mierzejewska T, Olszewska E (2007) Anthropological assessment of changes in living conditions of the rural population in Poland in the period 1967–2001. Ann Hum Biol 34(3):362–376
Lebanon FLORA (2013) http://www.lebanon-flora.org/species_scientific.php?bp_let=a. Accessed 22 Feb 2014
Lockett CT, Calvert CC, Grivetti LE (2000) Energy and micronutrient composition of dietary and medicinal wild plants consumed during drought. Study of rural Fulani, Northeastern Nigeria. Int J Food Sci Nutr 51(3):195–208
Marble A (1949) Diabetes mellitus in the U.S. Army in World War II. Mil Surg 105(5):357–363
Michael K, Fritsch RM, Hisoriev H, Kurbonova PA, Khassanov FO (2006) Wild Allium species (Alliaceae) used in folk medicine of Tajikistan and Uzbekistan. J Ethnobiol Ethnomed 2:18
Mittal PC, Srivastava S (2006) Diet, nutritional status and food related traditions of Oraon tribes of New Mal (West Bengal), India. Rural Remote Health 6:385
Nebel S, Pieroni A, Heinrich M (2006) Wild edible greens used in the Graecanic area in Calabria, Southern Italy. Appetite 47:333–342
Nitzan Kaluski D, Ophir E, Amede T (2002) Food security and nutrition—the Ethiopian case for action. Public Health Nutr 5(3):373–381
Oberdorfer E (1983) Pflanzensoziologische Exkursions Flora. Eugen Ulmer, Stuttgart
Ogle BM, Tuyet HT, Duyet NH, Dung NNX (2003) Food, feed or medicine: the multiple functions of edible wild plants in Vietnam. Econ Bot 57(1):103–117
Ogoye-Ndegwa C (2003) Traditional gathering of wild vegetables among the Luo of Western Kenya—a nutritional anthropology project 1. Ecol Food Nutr. 42(1):69–89
Ozcan M (2002) Nutrient composition of Rose (Rosa canina L.) seed and oils. J Med Food 5(3):137–140
Pardo De Santayana M, Tardío J, Morales R (2005) The gathering and consumption of wild edible plants in the Campoo (Cantabria, Spain). Int J Food Sci Nutr. 56(7):529–542
Petrovska BB, Kulevanova S, Jordanoski B, Stefov V (2001) Nutr Food 31:242
PFAF (2012) Plants for a Future: earth, plants, people (PFAF), 2012 http://www.pfaf.org/user/edibleuses.aspx. Accessed 23 Aug 2014
Pieroni A (1999) Gathered wild food plants in the upper valley of the Serchio River (Garfagnana), Central Italy. Econ Bot. 53(3):327–341
Pieroni A (2008) Local plant resources in the ethnobotany of Theth, a village in the Northern Albanian Alps. Genet Resour Crop Evol. 55(8):1197–1214
Pieroni A, Nebel, Santoro RF, Heinrich M (2005) Food for two seasons: culinary uses of non-cultivated local vegetables and mushrooms in a South Italian village. Int J Food Sci Nutr. 56(4):245–272

Redžić S (1993) Wild edible plants in the nutrition during the war in Bosnia and Herzegovina. Study of Faculty of Science, University of Sarajevo
Redžić A (1999a) Spontaneous abortion as an indication of degree of risk in pregnancy. Med Arh 53:65
Redžić S (1999b) Possibility of natural resources in the preparation of Galen and magistral preparation in the war conditions. Pharmacia 10(1):28–41
Redžić S (2006) Wild edible plants and their traditional use in the human nutrition in Bosnia-Herzegovina. Ecol Food Nutr 45(3):189–232
Redžić S (2007) The ecological aspect of ethnobotany and ethnopharmacology of population in Bosnia and Herzegovina. Coll Antropol 31(3):869–890
Redžić S (2009a) The patterns of ethnobotany of wild medical plants in western Balkan (SE Europe). Afr J Trad CAM 6(4 Suppl.):465
Redžić S (2009b) Biodiversity of endemic plants as a source of new medicines (W. Balkan, SE Europe). Planta Med 75:988
Redžić S (2010a) Use of wild and semi-wild edible plants in nutrition and survival of people in 1430 days of siege of Sarajevo during the war in Bosnia and Herzegovina (1992–1995). Coll Antropol 34(2):551–570
Redžić S (2010b) Wild medicinal plants and their usage in traditional human therapy (Southern Bosnia and Herzegovina, W. Balkan). Med Plants Res 4(11):1003–1027
Redžić A, Hadžihalilović J (2007) Influence of Some socio-economic factors on growth and development of the boys in the Tuzia region (Bosnia and Herzegovina). Coll Antropol 31(2):427–434
Redžić S, Dalmatin M, Hamidović M, Kadić J, Radević M, Ševo LJ (2003) Biodiversity, geodiversity and protection of natural and cultural heritages. National Environmental Action Plan of Bosnia and Herzegovina, Federation of BIH and RS, Sarajevo
Redžić S, Hodžić N, Tuka M (2005) Plant pigments (antioxidants) of medicinal plants Malva silvestris L. and Malva moschatta L. (Malvaceae). Bosn J Basic Med Sci 5:53–58
Redžić S, Barudanović S, Radević M (Eds) (2008) Bosnia and Herzegovina—a country of diversity. Overview and status of biological and landscape diversity of Bosnia and Herzegovina. Federal Ministry of Environment and Tourism of B & H, Convention on Biological Diversity, Global Environmental Facility & UNEP, Sarajevo
Redžić S, Biščević A, Redžić A (2009a) Possibilities of buckwheat Fagopyrum esculentum Moench in modern nutrition and phyto-therapy (Dinarides, W. Balkan). Planta Med 75(9):1006
Redžić S, Redžić A, Bišćević A (2009b) Use of wild edible plants in human nutrition during war in Bosnia and Herzegovina (W. Balkan). Afr J Trad CAM. 6(Suppl. 4):466
Redžić S, Sejdić N, Palić A (2009c) Afr J Trad CAM, 6(Suppl. 4):348
Redžić S, Barundanović S, Pilipović S (2010) Wild mushrooms and lichens used as human food for survival in war conditions; Podrinje—Zepa Region (Bosnia and Herzegovina, W. Balkan). Hum Ecol Rev 17(2):175–187
Rossi L, Mangasaryan N, Branca F (2005) Nutritional status and poverty assessment of vulnerable population groups in Armenia. Soz Praventivmed 50(3):166–176
Rossi L, Hoerz T, Thouvenot V, Pastore G, Michael M (2006) Evaluation of health, nutrition and food security programmes in a complex emergency: the case of Congo as an example of a chronic post-conflict situation. Public Health Nutr 9(5):551–556
SA (1991) Statistical annual of Bosnia and Herzegovina. Institute for Statistics of FB & H, Sarajevo
Saidov MK (2001) Classification of wild edible plants of central Tadzhikistan. Report of the Academy of Science of the Republic Tadzhikistan—Dept. of Biological and Medical Science (Izvestiya Akademii Nauk Respubliki Tadzhikistan—Otdelenie Biologicheskikh i Meditsinskikh nauk) 146(5):121–126
Salehi M, Kuhnlein HV, Shahbazi M, Kimiagar M, Kolahi AA, Mehrabi Y (2005) Effect of traditional food on nutrition improvement of Irania tribeswomen. Ecol Food Nutr 44(1):81–95
Salerno G, Guarrera PM, Caneva G (2005) Agricultural, domestic and handicraft folk uses of plants in the Tyrrhenian sector of Basilicata (Italy) J Ethnobiol Ethnomed. 1:2
Sanghvi T (ed) (2004) Nutrition essentials: a guide for program managers. Basic support for institutionalizing child survival (BASICS) II Project. USAID-BASICS-UNICEF-WHO

Shasha SM (2002) Morbidity in the ghettos during the Holocaust. Harefuah 141(1):364–368
Simopoulos AP, Gopalan C (2003) Plants in human health and nutrition policy. KARGER, Basel, Freiburg, Paris, London, New York, Bangalore, Bangkok, Singapore, Tokyo, Sydney
Smaijkić A, Zec S, Telebak B, Filipović-Hadžiomeragić A (1995) Changes in nutrition among residents and refuges in Sarajevo during the war. Eur J Clin Nutr 49(Suppl 2):S17–S22
Smith Fawzi MC, Aldoori W, Fawzi WW, Armijo-Hussein N (1997) The Gulf War, child nutrition and feeding practices in Iraq. Nutr Res 17(5):775–784
Tanji A, Nassif F (1995) Edible weeds in Morocco. Weed Technol 9:617–620
Tardio J, Pascual H, Morales R (2005) Wild food plants traditionally used in the province of Madrid, Central Spain. Econ Bot 59(2):122–136
Tardio J, Pardo-De-Santayana M, Morales R (2006) Ethnobotanical review of wild edible plants in Spain. Bot J Linn Soc 152:27–71
Toole MJ, Waldman RJ (1997) The public health aspects of complex emergencies and refugee situations 1. Annu Rev Public Health 18(1):283–312
Trichopoulou A, Vasilopoulou E, Hollman P, Chamalides Ch, Foufa E, Kaloudis Tr, Kromhout D, Miskaki Ph, Petrochilou I, Poulima E, Stafilakis K, Theophilou D (2000) Food Chem 70:319
Turan M, Kordali S, Zengin H, Dursun A, Sezen Y (2003) Macro and micro mineral contents of some wild edible leaves consumed in Eastern Anatolia. Acta Agric Scand B 53(9):129–137
Turrini A, Saba A, Perrone D, Cialfa E, D'Amicis A (2001) Original Communications—food consumption patterns in Italy: the INN-CA Study 1994–1996. Eur J Clin Nutr 55(7):571–588
Tutin TG, Heywood VH, Burges NA, Moore DM, Valentine DH, Walters S, Weeb DA (eds) (1964–1980) Flora Europea Cambridge. Cambridge University Press, London
Van den Eynden V, Cueva E, Cabrera O (2003) Wild foods from Southern Eduador. Econ Bot 57(4):576–603
Vespa J, Watson F (1995) Who is nutritionally vulnerable in Bosnia-Hercegovina? Br Med J 311:652–654
Volpato G, Godínez D, Beyra A (2009) Migration and ethnobotanical practices: the case of Tifey among Haitian immigrants in Cuba. Hum Ecol 37(1):43–53
Vračarić B, Bogojevski D, Mičković M (1966) Additional food sources in the cases of mass disasters. Hrana Ishr 7:141–149
Vračarić B, Čolić D, Uvalin M (1967) Our experiences in the use of wild-growing flora and fauna. Hran Ishr 7:181–186
Vračarić B (ed) (1977) Nutrition in nature. Military publishing institute and People's book. Ishrana u prirodi (Vojnoizdavački zavod i Narodna knjiga), Beograd
Watson F, Vespa J (1995) The impact of a reduced and uncertain food supply in three besieged cities of Bosnia-Hercegovina. Disasters 19(3):216–234
Watson F, Kulenović I, Vespa J (1995) Nutritional status and food security: winter nutrition monitoring in Sarajevo 1993–1994. Eur J Clin Nutr 49(Suppl 2):S23–S32
WHO (1988) Requirements of vitamin A, iron, folate and vitamin B12. Report of a Joint FAO/WHO Expert Consultation. Food and Agricultural Organization of the United Nations, Rome
WHO (1990) Diet, nutrition and the prevention of chronic diseases. WHO Technical Report Series 797. World Health Organization, Geneva
WHO (2000) Nutrition for health and development. A global agenda for combating malnutrition. World Health Organization, NHD, SDE. http://whqlibdoc.who.int/hq/2000/WHO_NHD_00.6.pdf. Accessed 22 Aug 2014
WHO (2002) Human vitamin and mineral requirements. Report of a joint FAO/WHO expert consultation Bangkok. Food and Nutrition Division. World Health Organization, Geneva
Wikipedia (2009) The war in Bosnia and Herzegovina. http://bs.wikipedia.org/wiki/opsadaSarajeva. Accessed 31 Aug 2009
Wynn A, Wynn M (1993) The effects of food shortage on human reproduction. Nutr Health 9(1):43–52
Zennie T, Ogzewalla D (1977) Ascorbic acid and vitamin A content of edible wild plants of Ohio and Kentuky. Econ Bot. 31:76–79

Chapter 10
Wild Food and Medicinal Plants Used in the Mountainous Albanian North, Northeast, and East: A Comparison

Andrea Pieroni and Cassandra L. Quave

10.1 Introduction

Albania, the small mountainous country located in the southwest Balkan Peninsula, has represented—and still represents today—a fascinating place for travelers and scholars to visit. Although the current borders of Albania were delineated in 1912, a number of Western European explorers and ethnographers traveled across the Albanian-speaking areas of the Balkans well before this date, invariably seduced by the overwhelming hospitality and austere characters of the Northern Albanians. A few of them also described the local folk-medical and food customs, providing a historic record of such practices in this region (Cozzi 1909, 1914; Durham 1923; Doda 2007).

The preservation of the Albanian identity, forged via the linguistic and cultural customs, has represented, in turn, a crucial constant of Albanian history, which underwent the establishment of Greek colonies, centuries of Roman rule, the Byzantine Empire, successive migrations of Slavic and Germanic groups from the North, five centuries of Ottoman domination, and, in the last century, the Italian fascist occupation during the Second World War, four decades (1945–1991) of the most tough communist dictatorship Europe had and the subsequent isolation of the country from the rest of the world. Perhaps due in part to this unique history of the past decades, Albania seems to uniquely offer ethnobiologists what they would probably call a "paradise": Hundreds of kilometers of untouched nature, a largely (still) traditional agricultural and especially pastoral lifestyle in the mountainous and rural

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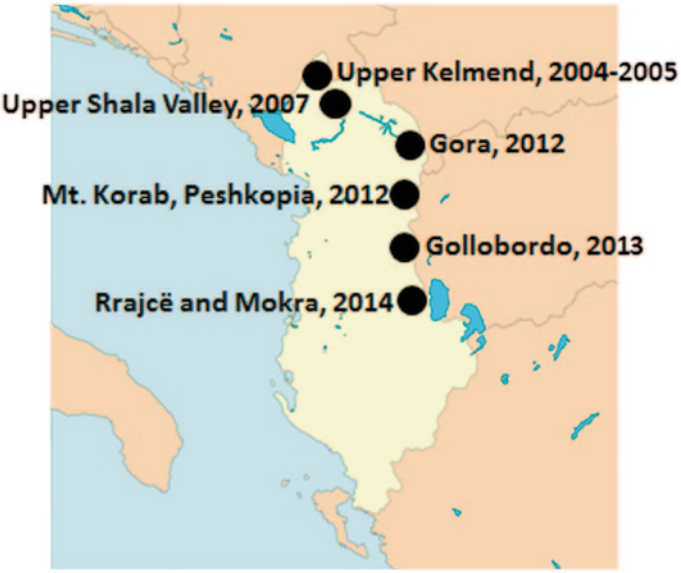

Fig. 10.1 Study areas in Albania, 2004–2014

areas, amazing natural arenas and views, and folkloric treasures to discover in remote places, which can be often accessed only using rough terrain vehicles.

Moreover, the Albanian mountains also represent a promising hotspot of biological diversity and local customs, as well as a rich repository of living—and yet not heavily studied—traditional botanical knowledge. These factors could play, in turn, a central role in the development of community-based management strategies for local natural resources, as well as sustainable ecotourism, small-scale herbal trade, and high-quality niche foods. Today, Albania already provides a large portion of the medicinal and aromatic herbs marketed in Europe, also due to an established "tradition," which was heavily reinforced during the communist period of gathering, drying, and trading wild medicinal plants (Kathe et al. 2003; Londoño 2008; Pieroni et al. 2014a, b).

10.2 Field Studies

Over the past decade (2004–2014), several villages of the Albanian North, Northeast and East were visited (Fig. 10.1) during a series of ethnobotanical field studies. Specifically, communities in the upper Shala Valley, upper Kelmend (Fig. 10.2), Mt. Korab (Fig. 10.3), and Gollobordo participated in these studies. In-depth open and semistructured interviews were conducted with elderly members of these communities, and informants were selected using snowball-sampling techniques. Informants were asked about traditional uses of food and medicinal plants

Fig. 10.2 Summer settlements in the pastures of upper Kelmend

(in use until a few decades ago or still in use today). Specifically, study participants were questioned about the local name(s) of each quoted taxon, the plant part(s) used, in-depth details about its/their manipulation/preparation, and actual medicinal or food use(s).

Interviews were conducted in Albanian, sometimes with the help of a simultaneous translator. Prior informed consent was always verbally obtained prior to conducting interviews and researchers adhered to the ethical guidelines of the American Anthropological Association (AAA 2012). During the interviews, informants were always asked to show the quoted plants. Taxonomic identification was conducted according to all the published volumes of the *Flora of Albania* (Paparisto et al. 1988; Qosia et al. 1992; Qosia et al. 1996; Vangjeli et al. 2000). Local names were transcribed following the rules of Ghegh Albanian standard language, which is the Albanian spoken in Kosovo and North (and Northeast) Albania.

Fig. 10.3 Landscape of the Albanian side of Mt. Korab

10.3 Results

In the following tables, we present the most commonly quoted and used wild (folk) taxa for the upper Shala Valley of northern Albania (Table 10.1), upper Kelmend of northern Albania (Table 10.2), Mt. Korab of Northeast Albania (Table 10.3), and Gollobordo of eastern Albania (Table 10.4). Genera or species that were among the top ten of cited botanic taxa in at least two of the study sites are underlined.

10.4 Discussion

10.4.1 The Pastoralist Nature of the Albanian Ethnobotany

The most commonly quoted and used wild food plants in the four considered areas are *Urtica dioica, Chenopodium bonus-henricus, and Rumex* spp., which are used as vegetables mainly cooked with dairy products and rice or, more often, as filling for homemade savory pies, traditionally made using flour created from local varieties of white maize. These plants represent the most common taxa to be found in the proximity of the houses and summer settlements in the mountainous ecosystems. Importantly, these species represent the vegetables of the Albanian pastoralist cuisine, which is characterized by a regular and large consumption of several dairy products, staples derived from the introduced maize and potato crops, occasionally beef, goat, pork (only among the Catholic Albanians of the north) and lamb meat, beans, and a few cultivated (onions, garlic, cabbage, and peppers) and wild plants.

It is interesting to note that while *Chenopodium bonus-henricus* is more commonly used in the north, *Rumex* spp. (mainly *Rumex patientia*) dominates in the northeast and east, while nettle is definitely *the* wild vegetable of all Albanian cuisines. With regard to the most important medicinal plants, in all northern,

Table 10.1 Most commonly quoted used wild food and medicinal plants in the upper Shala Valley, northern Albania (Pieroni 2008)

Botanical taxa	Part(s) used	Traditional food or medicinal uses
Chenopodium bonus-henricus L., Amaranthaceae	Leaves	Boiled and used with cream and/or butter as stuffing for *byrek* and *laknur* (savory pies)
Cornus mas L., Cornaceae	Fruit	Eaten raw, also as a food medicine to relieve intestinal troubles in children . It is macerated in barrels for 1–2 months, and then distilled to produce *raki* (*raki thanit*). This is considered the best *raki*. It is also used medicinally to relieve rheumatism (both drunk and rubbed on externally). Fruits are also boiled for 30 min in water and macerated to produce vinegar
Gentiana lutea L., Gentianaceae	Roots	Macerated in *raki* and drunk as a treatment for heart diseases. Gathered, dried, and sold in the city markets, especially in the past
Hypericum spp., Hypericaceae	Flowering aerial parts	Infusion (*caj*) of the dried aerial parts is used to treat abdominal pains, especially in children Applied with salt and tobacco leaves to heal wounds
Origanum vulgare L., Lamiaceae	Flowering aerial parts	Infusion (*caj*): drunk regularly throughout the year as a "social beverage" and also specifically for treating sore throats and colds (especially in children)
Plantago major L., Plantaginaceae	Leaves	Used externally as a hemostatic on wounds. In infusions for treating abdominal pains. In the past, it is gathered, dried and sold in the city markets
Rumex spp., Polygonaceae	Leaves	Boiled and used with cream and/or butter as a stuffing for pies (*byrek* and *laknur*)
Tilia cordata Mill., Malvaceae	Flowers	Infusion (*caj*) used to heal coughs, colds, and sore throats
Urtica dioica L., Urticaceae	Leaves	Boiled and used as filling for savory pies (*byrek* and *laknur*) with fresh butter (*burro-fresko*) or clarified butter (*tëlynë*) Rubbed on externally to treat arthritis
Vaccinium myrtillus L., Ericaceae	Fruit	Eaten raw or in infusions (*caj*). Also as eaten as a dried fruit for treating sore throats or for relieving digestive troubles

Table 10.2 Most commonly quoted and used wild food and medicinal plants in the upper Kelmend, northern Albania (Pieroni et al. 2005; Pieroni 2010)

Botanical taxa	Parts used	Traditional food or medicinal uses
Chenopodium bonus-henricus L., Amaranthaceae	Leaves	Eaten cooked, as filling for savory pies (*byrek*), generally adding various dairy products, especially cream and preserved butter
Fragaria vesca L., Rosaceae	Fruits	Eaten raw or in jams
Gentiana lutea L., Gentianaceae	Roots	Macerated in plum distillate (*raki*) for 1–2 days in cold water and drunk for the prevention of heart disease
Hypericum maculatum Crantz, Hypericaceae	Flowering aerial parts	Decoction, to treat digestive troubles and antidiarrhea (also used as a veterinary preparation, especially for sheep); to treat stomachache; as a tranquillizer; drunk every morning as a diuretic; to treat flu, sore throat, coughs, and bronchitis; and as an anthelmintic (used as a veterinary preparation for calves)
Lilium martagon L., Liliaceae	Tubers, dried	Decoction, to treat liver diseases (also as a veterinary preparation)
Origanum vulgare L., Lamiaceae	Aerial parts	Infusion, originally used to treat coughs; today drunk as a recreational beverage, and also as diuretic and digestive
Phyllitis scolopendrium (L.) Newman, Aspleniaceae	Leaves	Tea: to treat every respiratory and lung affliction
Tussilago farfara L., Asteraceae	Leaves	Externally used for treating wounds and as an anti-rheumatic; tea for treating respiratory diseases
Urtica dioica L., Urticaceae	Leaves	Boiled with flour and milk and eaten as a soup Boiled and used with cream (*masa*) as filling for savory pie (*byrek*)
Vaccinium myrtillus L., Ericaceae	Fruits	Decoction, to treat intestinal troubles; antidiarrheal; "to strengthen the stomach" and the eyes (especially in children); "blood cleansing"; also macerated in wild cherry-plum distillate (*raki*)

Table 10.3 Most commonly quoted and used wild food and medicinal plants in the Mt. Korab villages surrounding Peshkopia, northeast Albania (Pieroni et al. 2014)

Botanical taxa	Parts used	Traditional food or medicinal uses
Cornus mas L., Cornaceae	Fruits	Eaten raw or, more often, dried and consumed during the winter after boiling them (*ashaf*), also for treating diarrhea or stomachache. Used to make homemade preserves or syrups, which are also mixed with hot water and drunk as a healthy beverage and for treating stomachache. Fermented to make vinegar, which is considered healthy, especially against fever (topically applied on the forehead), or drunk with sugar as a healthy beverage. Mixed with bran and applied topically to treat mastitis in livestock. Distilled to create an alcoholic *raki,* which is considered very healthy and especially good for the heart (one small glass drunk daily)
	Flowering branches	Ritually used during the *lule ditvere* (literally meaning "flower of the summer") festival days. On the afternoon/evening of March 12th, a bouquet (also called *lule ditvere*) is arranged with the stems and flowers of *Helleborus* spp., aerial parts of *Hedera helix* and *Arum maculatum*, flowering *Cornus mas*, *Quercus* spp., *Corylus avellana* branches, *Evernia prunastri*, and another unidentified lichen. The bouquet is kept on the kneading trough for one day (13th March), and also (with breadcrumbs) on the churn. Both practices are seen as good omens for a prosperous food year (in the same day villagers distribute/offer each other boiled eggs and children burn aerial parts of *Juniperus communis* in the evening). On March 14th, the bouquet is then kept and hung at the entrance of the house, as a good omen (when it falls down, weeks later, has to be thrown in the river)
	Leaves and stems	Tea: stomachache, diarrhea, and diuretic
Hypericum perforatum L., Hypericaceae	Flowering aerial parts	Dried and used in homemade tea to treat stomach and digestive disorders, and, to a lesser extent, sore throat and as a diuretic. The infusion (sometimes prepared together with *Origanum vulgare*), because of its red color, is considered very healthy for the circulation of blood and for anemia. Decoction: topically applied to skin inflammations
Origanum vulgare L., Lamiaceae	Flowering aerial parts	Dried and used in homemade teas: very regularly drunk over the year as a healthy/preventive beverage. This tea is reputed to be especially beneficial for sore throats, cough, and flu/fever/headaches. Sometime in the past, bread was dipped into the tea, adding sugar, and the resulting preparation was consumed as a healthy food

Table 10.3 (continued)

Botanical taxa	Parts used	Traditional food or medicinal uses
Salvia verticillata L., Lamiaceae	Aerial parts	Used fresh, crushed, or the fresh juice is used as a cicatrizant, directly applied to wounds (humans), snake bites, and skin inflammations (animals)
Stachys tymphaea Hausskn., Lamiaceae	Flowering aerial parts	Dried and used to make teas for panacea, and especially for cold and flu
Rumex patientia L., Polygonaceae	Leaves	Used fresh as vegetables for homemade pies (*peta*). Crushed and mixed with animal fat for topical treatment of wounds
Rubus ulmifolius Schott., Rosaceae	Fruits	Consumed raw or in jams. Fermented to make *raki* (rare)
	Aerial parts	Crushed and mixed with clarified butter (*tëlynë*), topically applied to skin infections and wounds
Malus sylvestris (L.) Mill., Rosaceae	Fruits	Dried (*ashaf*) and consumed in winter after boiling them; considered healthy for persons affected by diabetes
Urtica dioica L., Urticaceae	Young aerial parts	Used as filling for homemade savory pies (*peta*) or mixed with rice and eggs (*burania*); rarely used as wrapping for *sarma*. They are also minced and preserved dried over the year and then blanched before the use
	Leaves	Rubbed onto the skin to treat rheumatic pains
	Roots	Dried: used to make a decoction used in external washes for treating rheumatisms or drunk for the same purpose (sometimes the decoction includes roots and leaves), or as a diuretic

Table 10.4 Most commonly quoted and used wild food and medicinal plants in Gollobordo, eastern Albania (Pieroni 2014)

Botanical taxa	Parts used	Traditional food or medicinal uses
Cornus mas L., Cornaceae	Fruits	Fermented and distilled into *raki;* syrup and compote (dried fruits boiled with water and sugar), concentrated syrup/soft jam (*pekmez*); fermented into vinegar; all these preparations are considered very healthy
Orchis spp., Orchidaceae	Tubers	Dried, powdered, then prepared in decoction, drunk as a reconstituent (often consumed with bread) to improve fertility in men; panacea
Origanum vulgare L., Lamiaceae	Flowering aerial parts	Infusion: recreational, antiflu, bechic, anti-hepatitis, for treating stomachaches, panacea
Plantago lanceolata L. and *P. major* L., Plantaginaceae	Leaves	Crushed and topically applied on wounds: hemostatic
Pyrus pyraster (L.) Du Roi and P. amygdaliformis Vill., Rosaceae	Fruits	Gathered after the frost, ripened on straw, and consumed dried or in compote
Rosa canina L., Rosaceae	Fruits	Infusion: sore throats, bechic, flu, panacea
Rubus spp., Rosaceae	Fruits	Consumed raw and jams
Rumex patientia L., Polygonaceae	Leaves	Boiled, and then used filling for pies or as vegetables cooked with dairy products
Tilia platyphyllos Scop., Malvaceae	Flowers	Infusion: panacea
Urtica dioica L., Urticaceae	Leaves	Boiled, and then used in filling for pies or cooked with rice and dairy products; traditionally dried and then used during the winter

Fig. 10.4 Trading collected and dried wild oregano (*Origanum vulgare*)

Fig. 10.5 The fruits of *Cornus mas* are highly valued as useful for medicinal and food applications

northeastern, and eastern sites, the flowering aerial parts of wild oregano (*Origanum vulgare*) tea dominate as the most frequently used *caj* (traditional tea) of the Albanians, mostly drunk for treating respiratory diseases, but more often considered a panacea, a healthy beverage and recreational tea (Fig. 10.4).

The flowering aerial parts of *Hypericum* spp. are also frequently used, but to a lesser extent than that of oregano, mainly for treating diseases of the gastrointestinal tract. The wild fruits of *Cornus mas* (Fig. 10.5), on the other hand, are consumed raw, or, more often, processed in a number of ways (including as preserves and fermented products). All of these preparations are considered healthy, placing these fruits as the most beloved of folk nutraceuticals among Albanians, and indeed, perhaps even among the entire Balkans. Lastly, with regard to skin diseases, *Plantago* spp. are instead the most commonly used taxa, which follow the same patterns of folk medicine in much of western Europe.

10.4.2 Resilience of Traditional Plant Knowledge in Albania

Resilience has been defined as the capability of socioecological systems to absorb disturbances and to retain their basic structures and functions. This principle is

founded on four pillars in particular: (1) the capability of systems of learning to live with change and absorb it, (2) of nurturing diversity for reorganization and renewal, (3) of combining different kinds of knowledge for learning, and (4) of creating opportunities for self organization (Berkes 2003; Folke et al. 2003; Berkes and Turner 2006).

The resilience of plant knowledge systems in the Albanian mountains, which at the moment seem to be largely in the hands of the elderly and mid-aged population, will surely depend upon the capability of the local populations to adapt to the major socioeconomic turmoils that are ongoing in these areas since the end of the communism in the 1990s. The Albanian mountains have, in fact, faced immense changes in the past two decades including road collapses and, sometimes, communication infrastructures. This has been compounded by huge migration waves of young labor forces to western Europe and the USA in the 1990s and the daily battle in struggling for survival during the successive decade. The transition underway today is one of a timid start on some ecotouristic activities, which have been made possible in many cases due to new investments by Albanians who have migrated back home, or, as in the case of the upper Shala Valley, the explosion of a massive touristic development, which has brought the system to a state of collapse in terms of sustainability.

10.5 Conclusion

Local environmental resources derived from plants continue to play an important role in the provision of dietary and medical care for both humans and their livestock in the northern, northeastern, and eastern mountainous regions of Albania. Plant knowledge in the Albanian mountains is deeply embedded with pastoralist activities, which have represented for centuries, and possibly millennia, the cornerstone of local sociocultural and environmental frameworks. A major requirement for resilience of the whole system is the ability of all of the actors involved in the development of the rural and mountainous areas in Albania (local populations, NGOs, and institutions) to work together to foster trajectories for the truly sustainable management of natural resources. One potential path forward could, for example, be exemplified through the development of traditional animal breeding activities and ecotourism. This could perhaps even be enhanced with the help of new technologies, such as social media, which the youngest generations in the mountains are already heavily dependent upon. The sustainable development of local small-scale economies will invariably be strengthened through a merging of elements of the past and future, with the legacy of traditional environmental knowledge of local resources being placed at its core.

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References

AAA (2012) Statement on ethics: principles of professional responsibility. http://www.aaanet.org/profdev/ethics/upload/Statement-on-Ethics-Principles-of-Professional-Responsibility.pdf. Accessed 26 March 2013

Berkes F, Turner NJ (2006) Knowledge, learning and the evolution of conservation practice for social-ecological system resilience. Hum Ecol 34(4):479–494

Berkes F, Colding J, Folke C (2003) Navigating social-ecological systems: building resilience for complexity and change. Cambridge University Press, Cambridge

Cozzi E (1909) Malattie, morte, funerali nelle montagne d'Albania. Anthropos 4:903–918

Cozzi E (1914) Credenze e superstizioni nelle montagne dell'Albania. Anthropos 9:449–476

Doda BE, Nopcsa F (2007) Albanisches Bauernleben in oberen Rekatal dei Dibra (Makedonien). LIT, Vienna

Durham E (1923) Some Balkan remedies for disease. Man 23:131–135

Folke C et al (2003) Synthesis: building resilience and adaptive capacity in social-ecological systems. In: Berkes F, Colding J, Folke C (eds) Navigating social-ecological systems: building resilience for complexity and change. Cambridge University Press, Cambridge, pp 352–387

Kathe W, Honnef S, Heym A (2003) Medicinal and aromatic plants in Albania, Bosnia-Herzegovina, Bulgaria, Croatia and Romania. BfN, Bonn

Londoño PT, Doka D, Becker H (2008) Collection of medicinal and aromatic plants in Albania—an analysis given by examples of the surroundings of Peshkopi (Dibër Region). Z Arznei—Gewurzpflanzen 13(4):153–160

Paparisto K, Demiri M, Mitrushi I, Qosia X (1988) Flora e Shqipërisë 1. Tiana, Akademia e Shkencave e RPS të Shqipërisë. Qendra e Kërkimeve Biologjike

Pieroni A (2008) Local plant resources in the ethnobotany of Theth, a village in the Northern Albanian Alps. Genet Resour Crop Evol 55(8):1197–1214

Pieroni A (2010) People and plants in Lëpushë. Traditional medicine, local foods, and post-communism in a North Albanian village. In: Santayana Pardo de M, Pieroni A, Puri R (eds) Ethnobotany in the new Europe: people, health and wild plant resources. Berghahn, New York, pp 16–50

Pieroni A, Dibra B, Grishaj G, Grishaj I, Gjon Maçai S (2005) Traditional phytotherapy of the Albanians of Lepushe, Northern Albanian Alps. Fitoterapia 76(3–4):379–399

Pieroni A, Nedelcheva A, Hajdari A et al (2014a) Local knowledge on plants and domestic remedies in the mountain villages of Peshkopia (Eastern Albania). J Mt Sci 11(1):180–194

Pieroni ACK, Nedelcheva A, Hajdari A, Mustafa B, Quave CL (2014b) Resilience at the border: traditional botanical knowledge among Macedonians and Albanians living in Gollobordo, Eastern Albania. J Ethnobiol Ethnomed 31:10

Qosia X, Paparisto K, Demiri M, Vangjeli J, Balza E (1992) Flora e Shqipërisëhqi. Tirana, Akademia e Shkencave e Republikes se Shqipërise. Instituti i Kërkimeve Biologjike

Qosia X, Paparisto K, Vangjeli J, Babi R (1996) Flora e Shqipërisëhqip. Tirana, Akademia e Shkencave e Republikes se Shqipërisë. Instituti i Kërkimeve Biologjike

Vangjeli J, Ruci B, Mullaj A, Paparisto K, Qosja XH (2000) Flora e Shqipërisë 4. Tirana, Akademia e Shkencave e Republikes se Shqipërisë. Instituti i Kërkimeve Biologjike

Part III
Building Small-scale, Environmentally and Socially Sustainable Economies

Chapter 11
Medicinal Plants in Northern Montenegro: Traditional Knowledge, Quality, and Resources

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11.1 Introduction

Investigations of medicinal and aromatic plants in Montenegro were undertaken by the Institute for Medicinal Plant Research "Dr. Josif Pančić" from Belgrade starting in 1966. The first stages of this research, which include data on the Komovi and Prokletije mountains, are presented elsewhere (Milojević and Mihajlov 1966). Subsequently, significant contributions to the knowledge of medicinal plants in the Prokletije region were also made by Lakušić and Milojević (1972), Mihajlov et al. (1974a, b), and Tucakov et al. (1974). Information concerning these and other related publications are available in *Bibliography of the Flora and Vegetation of Montenegro* (Pulević 1980a, 1985; Pulević and Bulić 2004). Recent data involving the Prokletije Mountains were published by Aljančić et al. (2008), Menković et al. (2011), Jovančević et al. (2011), and Balijagić et al. (2012).

Although Montenegro lies on a relatively small territory of 13,812 km^2, about 3600 species and subspecies of vascular plants have been inventoried. Among them, ca. 700 species have been recognized as medicinal plants, with approximately 300 of them being commonly used in the pharmaceutical industry and in traditional medicine (Rohlena 1942; Pulević 1965, 1980b, 2005). It is speculated that the richness and diversity of flora of Montenegro are a consequence of its specific biological and geological history through which the Balkan Peninsula passed from the Tertiary time till now (Stevanović et al. 1995). In this chapter, we present the results of recent ethnobotanical, ethnomedicinal, and chemical research of the flora of Montenegro.

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Fig. 11.1 Mountain hut, Sinjajevina

11.1.1 Research Area and Population

Montenegro is found in the western part of the Balkan Peninsula and southern part of the Dinaric Alps, with a coast on the southeast part of the Adriatic Sea. The geographic relief is characterized by a great complexity, with small areas of lowlands, a predominance of mountains and highlands, and sudden altitudinal changes over small distances (Radojičić 1996; Šehić and Šehić 2005). The dominant area investigated in this study comprises the Prokletije massif, including Visitor (2211 m.a.s.l.), Bogićevica (2380 m.a.s.l.), and Popadija (2057 m.a.s.l.) mountains, with Ravni ključ, Karaula (1915 m.a.s.l.), Gurikulj (2120 m.a.s.l.), and Trojan (2190 m.a.s.l.). Also, an inventory of medicinal flora was carried out on these mountains: Mokra (1911 m.a.s.l.), Čakor (1849 m.a.s.l.), Komovi (2464 m.a.s.l.), Planinica (2073 m.a.s.l.), Sinjavina (2260 m.a.s.l., Fig. 11.1), and Rogamski kom (2308 m.a.s.l.).

The settlements and villages involved in these examinations were located at different altitudes (900–1900 m.a.s.l.), and most of the inhabitants were from settlement Plav (population: 10,000–12,000). The native residents are of Christian and Muslim religions. We interviewed 75 individuals (46 females and 29 males), 40–82 years old (mean age 57) from 2 settlements, 14 villages, and 15 summer settlements mainly engaged in agriculture and cattle breeding (Figs. 11.2 and 11.3).

11.2 Ethnobotanical Investigations

11.2.1 Botanical Survey

Biodiversity plays a crucial role in ecosystem stability and productivity. Quantitative information, including species richness and abundance, can help to guide

Fig. 11.2 Ethnobotanical interviews, Visitor Mountain

Fig. 11.3 Medicinal plants collector

sustainable management strategies, for ecosystem resources to mitigate adverse disturbances. These disturbances constitute serious threats to ecosystem and may cause irreversible damage (Noor Alhamad 2006). During our expeditions in Northern Montenegro, 412 plant species were identified, and the dominant species recorded in specific localities are presented in Table 11.1. Among them, a small number of commonly used medicinal plants was recorded, and their distribution is mainly restricted to one or two localities. The most abundant family is Rosaceae, followed by Cupressaceae and Lamiaceae. The highest number of species has been reported for Visitor Mountain.

Quite a few endemic species (38) were identified (see Table 11.1). Among them, the species belonging to genera of the Asteraceae and Caryophyllaceae families were relatively abundant. As endemic species are interesting as potential new raw material for the pharmaceutical industry, especially those belonging to the genera from which some species are officinal in pharmacopoeas, some of them were collected for further chemical and pharmacological studies.

Table 11.1 Dominant and endemic plant species recorded in the investigated areas

Botanical taxon	Dominant	Endemic	Locality											
			1	2	3	4	5	6	7	8	9	10	11	12
Acanthaceae														
Acanthus balcanus Heywood & I. B. Richardson	✓		−	−	−	−	−	−	−	−	−	+	−	−
Adoxaceae														
Sambucus ebulus L.	✓		−	−	−	−	+	−	−	−	−	+	−	−
Sambucus nigra L.	✓		−	−	−	−	+	−	−	−	−	+	−	−
Amaranthaceae														
Chenopodium bonus-henricus (L.) Rchb.	✓		+	−	−	−	−	−	−	−	−	−	−	−
Apiaceae														
Aegopodium podagraria L.	✓		−	−	−	−	−	−	−	−	−	+	−	−
Athamantha haynaldi Borbas & Uechtr.		✓	−	−	−	−	−	−	−	−	−	+	−	−
Chaerophyllum coloratum L.		✓	−	−	−	−	+	−	−	−	−	−	−	−
Eryngium palmatum Pančić & Vis.		✓	−	−	−	−	−	−	−	−	+	−	−	−
Foeniculum vulgare Mill.	✓		−	−	−	−	−	−	−	−	−	−	+	−
Heracleum sphondylium L.	✓		−	−	−	−	−	−	−	+	−	+	+	−
Laserpitium siler L.	✓		+	−	−	−	−	−	−	−	+	−	−	−
Meum mutellina Gaertn.	✓		+	−	−	−	−	−	−	−	−	−	−	−
Pimpinella serbica (Vis.) Benth. & Hook.f. ex Drude		✓	+	−	+	−	−	−	−	−	−	−	−	−
Sanicula europaea L.	✓		+	−	−	−	−	−	−	−	−	−	−	−
Aristolochiaceae														
Asarum europaeum L.	✓		+	−	−	−	−	−	−	−	−	−	−	−
Asparagaceae														
Convallaria majalis L.	✓		+	−	−	−	−	−	−	−	−	−	−	−
Asteraceae														
Achillea abrotanoides Vis.		✓	+	−	−	+	−	−	−	−	+	+	−	−
Achillea ageratifolia (Sm.) Boiss	✓		−	−	−	−	−	−	−	−	−	−	−	+
Achillea clavennae L.	✓		+	−	−	−	−	−	−	−	+	+	+	+
Achillea fraasii Schultz Bip.	✓		+	−	−	−	−	−	−	−	−	−	−	−

Table 11.1 (continued)

Botanical taxon	Dominant	Endemic	Locality											
			1	2	3	4	5	6	7	8	9	10	11	12
Achillea lingulata Waldst. & Kit.		✓	+	+	−	−	−	+	−	−	+	−	+	−
Achillea millefolium L.	✓		−	−	+	−	−	−	−	−	−	−	−	−
Adenostyles alliariae (Gouan) Kern.	✓		+	−	−	−	−	−	−	−	−	−	−	−
Amphoricarpus autariatus Blečić & Mayer		✓	+	−	−	+	−	−	−	−	+	+	−	+
Antenaria dioica (L.) Gaertn.	✓		−	−	−	−	−	+	−	−	+	−	+	+
*Anthemis carpatica*Waldst & Kit. ex Willd.	✓		−	+	−	−	−	−	−	−	+	−	−	−
Apoceris foetida (L.) Less	✓		+	−	−	−	−	−	−	−	−	−	−	−
Arthemisia absinthium L.	✓		−	−	−	−	−	−	−	−	−	+	−	−
Arthemisia vulgaris L.	✓		−	−	−	−	−	−	−	−	−	+	−	−
Aster alpinus L.	✓		+	−	−	−	−	−	−	−	+	−	−	−
Carlina acaulis L.	✓		−	−	−	−	−	−	−	−	−	+	−	−
Centaurea nervosa Willd.	✓		−	−	−	−	−	+	+	−	−	−	−	−
Cicerbita alpina (L.) Wallr.	✓		−	−	−	−	+	−	−	−	−	−	−	−
Cichorium intybus L.	✓		−	−	−	−	−	−	−	−	−	+	−	−
Cirsium acaulis L.	✓		−	−	−	−	−	+	−	−	−	−	−	−
Cirsium rivulare (Jacq.) Lk.	✓		−	−	−	−	−	−	−	+	−	−	−	−
Crepis dinarica (Beck) Siljak-Yakovlev & Wraber	✓		−	−	−	−	−	+	−	−	−	−	+	−
Crepis praemorsa (L.) Tausch subsp. *dinarica* (Beck) P. D. Sell		✓	+	−	−	−	−	−	−	−	−	−	−	−
Doronicum columnae Ten.	✓		+	−	−	−	−	−	−	−	−	−	−	−
Eupatorium cannabinum L.	✓		−	−	−	−	−	−	−	−	−	+	−	−
Hieracium auranthiacum L.	✓		−	−	+	−	−	−	−	−	−	−	−	−
Hieracium pilosella L.	✓		+	+	−	−	−	−	−	−	−	−	−	+
Homogyne alpina (L.) Cass.	✓		+	+	−	−	−	−	−	−	+	−	+	−
Inula hirta L.	✓		−	−	−	−	−	−	−	−	−	+	−	−
Leucanthemum vulgare Lam.	✓		+	−	+	−	−	−	−	−	−	+	−	−
Petasites hybridus (L.) G. M. Sch.	✓		−	−	−	−	+	−	−	+	−	−	−	−

Table 11.1 (continued)

Botanical taxon	Dominant	Endemic	Locality											
			1	2	3	4	5	6	7	8	9	10	11	12
Scorsonera rosea W. & K.	✓		−	+	−	−	−	+	+	−	+	−	+	+
Senecio carpaticus Herb.	✓		−	+	−	−	−	−	−	−	−	−	+	−
Senecio fuschii Gmel.	✓		+	−	−	−	−	−	−	+	−	+	−	−
Senecio othonnae M. B.	✓		−	−	−	−	−	−	−	−	−	+	−	−
Senecio rupester W. & K.	✓		−	−	−	−	−	−	−	−	+	+	−	−
Tanacetum corymbosum (L.) Schultz.-Bip.	✓		−	−	−	−	−	−	−	+	−	+	−	−
Tanacetum larvatum (Griseb) Kanitz.		✓	+	+	−	+	−	−	−	−	−	+	+	−
Tanacetum macrophyllum (Willd.) Schultz.-Bip.	✓		−	−	−	−	−	−	−	+	−	+	−	−
Taraxacum officinale F.H.Wigg.	✓		−	−	+	+	−	+	+	−	+	−	−	−
Telekia speciosa (Schreb.) Baumg.	✓		+	−	−	−	−	−	−	+	−	+	−	−
Tussilago farfara L.	✓		+	−	−	−	+	−	−	+	+	+	−	−
Betulaceae														
Alnus glutinosa L.	✓		−	−	−	−	−	−	−	+	−	+	−	−
Corylus avellana L.	✓		−	−	−	−	−	−	−	−	−	+	−	−
Boraginaceae														
Echium vulgare L.	✓		−	−	−	−	−	−	−	−	−	+	−	−
Brassicaceae														
Barbarea bosniaca Murb.	✓		−	+	−	−	−	−	−	−	−	−	−	−
Dentaria bulbifera (L.) Crantz.	✓		+	−	−	−	−	−	−	−	−	−	−	−
Dentaria enneaphyllos L.	✓		+	−	−	−	−	−	−	−	−	−	−	−
Nasturtium officinale R. Br.	✓		−	+	−	−	−	−	−	−	−	−	−	−
Campanulaceae														
Campanula glomerulata L.	✓		−	−	+	−	−	−	−	−	−	−	−	−
Campanula moesiaca Velen.		✓	+	−	−	−	−	−	−	−	−	−	−	−
Campanula trichocalycina Ten.	✓		+	−	−	−	−	−	−	−	−	−	−	−
Jasione orbiculata Gris.	✓		−	−	−	−	−	+	+	−	−	−	−	−
Phyteuma orbiculare L.	✓		−	−	−	−	−	+	−	−	−	−	−	−

Table 11.1 (continued)

Botanical taxon	Dominant	Endemic	Locality											
			1	2	3	4	5	6	7	8	9	10	11	12
Caprifloraceae														
Valeriana bertiscea Panč.		✓	−	−	−	−	−	−	−	−	+	−	+	−
Valeriana montana L.	✓		+	−	−	−	−	+	+	−	+	+	+	−
Valeriana officinalis L.	✓		−	−	−	−	+	−	−	+	−	+	−	−
Valeriana pancici Halacsy & Bald.		✓	−	−	−	−	−	−	−	−	−	−	+	−
Caryophyllaceae														
Cerastium dinaricum G. Beck. & Szysz.		✓	−	−	−	−	−	−	−	−	+	−	−	−
Cerastium grandiflorum Waldst. & Kit.		✓	−	−	−	−	−	−	−	−	+	−	−	−
Dianthus bertisceus (Rech) Mayer & Trpin		✓	−	−	−	−	−	+	−	−	−	−	−	−
Dianthus carthusianorum L.	✓		+	−	−	−	−	−	−	−	−	−	−	−
Dianthus deltoides L.	✓		−	−	−	−	−	−	+	−	−	−	−	−
Dianthus knappii (Pant.) Asch. & Kanitz ex Borbás		✓	+	−	−	−	−	−	−	−	−	−	−	−
Drypis spinosa L.	✓		−	−	−	−	−	−	−	−	+	−	−	−
Saponaria officinalis L.	✓		−	−	−	−	−	−	−	−	−	+	−	−
Silene macrantha (Pančić) Neumayer		✓	−	−	−	−	−	−	−	−	−	−	+	−
Silene sendtneri Boiss.		✓	+	+	−	−	−	−	+	−	+	−	+	−
Stellaria nemorum L.	✓		+	−	−	−	−	−	−	−	−	−	−	−
Viscaria viscosa Asch.	✓		−	−	−	−	−	−	+	−	−	−	−	−
Cistaceae														
Helianthemum alpinum Delarbre	✓		+	−	−	−	−	+	+	−	−	−	−	−
Helianthemum grandiflorum (Scop.) Lam. & DC.	✓		+	−	−	−	−	−	−	−	−	−	−	−
Cornaceae														
Cornus mas L.	✓		−	−	−	−	−	−	−	−	−	+	−	−
Crassulaceae														
Sedum acre L.	✓		−	−	−	−	−	−	−	−	−	+	−	+
Sempervivum kosanini Praeger		✓	+	+	−	−	−	−	−	−	−	−	+	−
Cucurbitaceae														

Table 11.1 (continued)

Botanical taxon	Dominant	Endemic	Locality											
			1	2	3	4	5	6	7	8	9	10	11	12
Bryonia alba L.	✓		−	−	−	−	−	−	−	−	−	+	−	−
Cupressaceae														
Juniperus communis L.	✓		−	−	−	−	−	+	−	−	−	−	−	−
Juniperus nana Willd.	✓		−	+	+	−	−	+	+	−	−	−	−	−
Dipsaceceae														
Cephalaria pastricensis Dorfl & Hayek		✓	−	−	−	−	−	−	−	−	−	+	−	−
Scabiosa graminifolia L.	✓		+	−	−	−	−	−	−	−	+	−	−	+
Scabiosa silenifolia Waldst. & Kit.		✓	−	−	−	−	+	−	−	−	−	−	−	−
Equisetaceae														
Equisetum arvense L.	✓		−	−	−	−	−	−	−	−	−	+	−	−
Ericaceae														
Arctostaphylos uva-ursi L.	✓		+	−	−	−	−	+	+	−	−	+	+	−
Arctous alpinus (L.) Niedenzu	✓		−	−	−	−	−	−	−	−	+	−	+	−
Vaccinium myrtillus L.	✓		+	+	+	+	−	+	+		+	−	+	+
Vaccinium uliginosum L.	✓		−	+	−	−	−	+	+	−	+	−	+	+
Euphorbiaceae														
Euphorbia myrsilites L.	✓		+	−	−	−	−	−	−	−	−	−	−	−
Fabaceae														
Anthyllis aurea Welden ex Host.	✓		+	−	−	−	−	−	+	−	−	−	−	−
Anthyllis jacquinii Kern.	✓		−	−	−	−	−	−	+	−	−	−	−	−
Anthyllis vulneraria L.	✓		+	−	+	+	−	+	+	−	+	+	−	+
Astragalus glycyphyllos L.	✓		−	−	−	−	+	−	−	−	−	+	−	−
Coronilla varia (L.) Lassen	✓		−	−	−	−	−	−	−	−	−	+	−	−
Galega officinalis L.	✓		−	−	−	−	+	−	−	−	−	+	−	−
Genista sagittalis L.	✓		+	−	−	−	−	−	−	−	−	−	−	−
Lotus corniculatus L.	✓		−	−	−	−	−	−	−	−	−	+	−	−
Melilotus officinalis (L.) Pall.	✓		−	−	−	−	−	−	−	−	−	+	−	−

Table 11.1 (continued)

Botanical taxon	Dominant	Endemic	Locality											
			1	2	3	4	5	6	7	8	9	10	11	12
Onobrychis montana DC. subsp. *scardica* (Griseb.) P.W.Ball.		✓	−	−	−	−	−	−	−	−	+	−	−	−
Onobrychis scardica (Griseb) Halácsy		✓	+	−	−	+	−	−	+	−	+	+	+	−
Oxytropis campestris (L.) DC. subsp. dinarica Murb.		✓	−	−	−	−	−	+	+		+		+	−
Oxytropis halleri Bunge	✓		−	−	−	+	−	−	−	−	−	−	−	−
Trifolium alpinum L.	✓		+	−	+	−	−	−	−	−	−	−	−	−
Trifolium badium Schreb.	✓		−	−	+	−	−	−	−	−	−	−	−	−
Trifolium montanum l.	✓		+	−	−	−	−	−	+	−	−	−	−	−
Trifolium pratense L.	✓		−	−	−	+	+	−	−	−	+	+	−	−
Fagaceae														
Fagus moesiaca (Maly) Scecz.	✓		−	−	−	+	−	−	−	−	−	−	−	−
Fagus silvatica L.	✓		+	−	−	−	−	−	−	−	−	−	−	+
Gentianaceae														
Gentiana asclepiadea L.	✓		+	−	+	−	−	−	−	−	−	−	−	−
Gentianella bulgarica (Velen.) Holub.		✓	−	−	−	−	−	−	−	+	−	−	−	−
Gentiana cruciata L.	✓		+	−	++	−	−	−	−	−	−	−	−	−
Gentiana kochiana Perrier & Songeon	✓		+	+	−	−	−	+	+	−	+	−	+	+
Gentiana lutea L.	✓		+	−	−	−	−	−	−	−	−	−	−	−
Gentiana punctata L.	✓		−	−	−	−	−	−	−	−	−	−	+	−
Gentiana utriculosa L.	✓		+	−	+	−	−	+	+	−	+	+	−	+
Gentiana verna L.	✓		+	+	−	−	−	+	+	−	+	−	+	+
Gentianella crispata (Vis.) Holub.	✓		−	−	+	−	−	−	−	−	−	−	−	−
Geraniaceae														
Geranium pratense L.	✓		−	−	−	−	−	+	+	−	−	−	−	−
Geranium reflexum L.	✓		+	−	−	−	−	−	−	−	−	−	−	−
Geranium robertianum L.	✓		+	−	−	−	−	−	−	+	−	+	−	−
Geranium sanguineum L.	✓		−	−	−	+	−	−	−	−	−	−	−	−

Table 11.1 (continued)

Botanical taxon	Dominant	Endemic	Locality											
			1	2	3	4	5	6	7	8	9	10	11	12
Geranium silvaticum L.	✓		+	−	−	+	−	−	−	−	−	−	−	−
Hypericaceae														
Hypericum alpinum Waldst. & Kit.	✓		+	−	−	−	−	−	−	−	−	−	−	−
Hypericum barbatum Jacq.	✓		−	+	+	−	−	+	−	−	−	+	−	+
Hypericum hirsutum L.	✓		+	−	−	−	+	−	−	−	−	−	−	−
Hypericum maculatum Crantz.	✓		+	−	+	−	−	+	+	−	+	−	−	+
Hypericum perforatum L.	✓		−	−	+	−	−	−	−	−	−	+	+	−
Hypericum richeri Vill.	✓		−	+	−	−	−	+	+	−	+	+	+	+
Iridaceae														
Iris reichenbachii Heuffel.		✓	+	−	−	−	−	−	−	−	−	−	−	−
Lamiaceae														
Acinos alpinus (L.) Moench	✓		−	−	−	−	−	−	−	−	−	−	−	+
Ajuga reptans L.	✓		−	−	+	−	−	+	−	−	−	−	−	−
Calamintha alpina Mill.	✓		−	−	−	+	−	−	−	−	+	−	−	−
Calamintha grandiflora (L.) Moench.	✓		+	−	−	−	−	−	−	−	−	+	−	−
Calamintha vulgaris (L.) Halascy non Clairv.	✓		−	−	−	−	−	−	−	−	−	+	−	−
Galeobdolon luteum L.	✓		+	−	−	−	−	−	−	−	−	−	−	−
Leonurus cardiaca L.	✓		−	−	−	−	−	−	−	−	−	+	−	−
Mentha aquatica L.	✓		+	−	−	−	−	−	−	−	−	−	−	−
Origanum vulgare L.	✓		+	−	−	+	+	−	−	−	−	+	−	−
Salvia pratensis L.	✓		−	−	−	−	−	−	−	−	−	+	−	−
Salvia verticillata L.	✓		−	−	−	−	−	−	−	−	−	+	−	−
Satureja montana L.	✓		−	−	−	−	−	−	−	−	−	+	−	−
Scutellaria alpina L.	✓		−	−	−	−	−	+	−	−	−	−	−	−
Scutellaria altissima L.	✓		−	−	−	−	−	−	−	−	−	+	−	−
Stachys arvensis L.	✓		+	−	−	−	−	−	−	−	−	−	−	−
Stachys jacquini (Gren. & Godr.) Fritsch	✓		+	−	−	+	−	+	−	−	−	−	−	−

Table 11.1 (continued)

Botanical taxon	Dominant	Endemic	Locality											
			1	2	3	4	5	6	7	8	9	10	11	12
Teucrium chamaedrys L.	✓		−	−	−	−	−	−	−	−	−	+	−	−
Teucrium montanum L.	✓		−	+	−	+	−	+	−	−	−	−	−	+
Thymus serpyllum L.	✓		−	−	−	−	−	−	−	+	+	−	−	−
Liliaceae														
Lilium albanicum Griseb.	✓		+	−	−	−	−	−	−	−	−	+	−	−
Lilium martagon L.	✓		−	−	−	−	+	−	−	−	−	+	−	−
Linaceae														
Linum capitatum Kit.	✓		+	−	+	−	−	+	+	−	+	−	+	+
Malvaceae														
Malva moschata L.	✓		−	−	−	−	−	−	−	−	−	+	−	−
Melanthiaceae														
Paris quadrifolia L.	✓		+	−	−	−	−	−	−	−	−	−	−	−
Veratrum album L.	✓		+	+	+	+	−	−	−	+	+	+	+	+
Menyathaceae														
Menyanthes trifoliata L.	✓		−	−	−	−	−	−	−	−	−	−	+	−
Nartheciaceae														
Narthecium scardicum Košanin		✓	−	+	−	−	−	−	−	−	−	−	−	−
Onagraceae														
Epilobium angustifolium L.	✓		−	−	−	−	+	−	+	+	−	+	+	−
Epilobium montanum L.	✓		+	−	−	−	−	−	−	−	−	+	+	−
Orchidaceae														
Dactylorhiza cordigera (Fr.) Verm.	✓		+	−	−	−	−	−	−	−	−	−	−	−
Nigritella nigra L.	✓		−	−	−	−	−	+	−	−	+	−	+	−
Orchis macula L.	✓		+	−	−	−	−	−	−	−	−	−	−	−
Orobanchaceae														
Melampyrum nemorosum L.	✓		−	−	−	−	−	−	−	−	−	+	−	−
Oxalidaceae														

Table 11.1 (continued)

Botanical taxon	Dominant	Endemic	Locality											
			1	2	3	4	5	6	7	8	9	10	11	12
Oxalis acetosella L.	✓		+	−	−	−	−	−	−	−	−	−	−	−
Parmeliaceae														
Evernia prunasti (L.) Ach.	✓		+	−	−	−	−	−	−	−	−	−	−	−
Usnea barbata (L.) F. H. Wigg.	✓		+	−	−	−	−	−	−	−	−	−	−	−
Pinaceae														
Abies alba Mill.	✓		+	−	−	−	−	−	−	−	−	−	−	−
Pinus heldreichii Christ.		✓	−	−	−	+	−	−	−	−	−	−	−	−
Pinus peuce Gris.		✓	+	−	−	+	−	+	−	−	−	−	−	−
Plantaginaceae														
Linaria vulgaris Mill.	✓		−	−	−	−	−	−	−	−	−	−	−	−
Plantago lanceolata L.	✓		+	−	−	+	−	−	−	−	−	−	−	−
Plantago media L.	✓		+	−	+	−	−	−	−	−	−	−	−	+
Plantago reniformis G. Beck.		✓	+	−	−	+	−	−	−	−	−	−	−	−
Veronica chamaedrys L.	✓		+	−	−	−	−	−	−	−	−	−	−	−
Veronica officinalis L.	✓		−	−	+	−	−	−	+	−	−	−	−	−
Veronica teucrium L.	✓		−	−	−	−	−	+	+	−	−	−	−	−
Veronica urticifolia Jacq.	✓		−	−	−	−	+	−	−	+	−	−	−	−
Wulfenia blecicii R. Lakušić		✓	+	−	−	+	−	+	−	−	−	−	−	−
Plumbaginaceae														
Armeria canescens (Host) Boiss.	✓		+	−	−	−	−	−	−	−	−	−	−	−
Polygalaceae														
Polygala amara L.	✓		+	−	−	−	−	+	+	−	−	−	−	−
Polygala major Jacq.	✓		−	−	−	−	−	+	−	−	−	−	−	−
Polygonaceae														
Polygonum alpinum All.	✓		−	−	−	−	−	−	−	−	+	−	−	−
Polygonum viviparum L.	✓		+	−	−	−	−	+	−	−	+	−	−	−
Rumex acetosella L.	✓		−	−	−	−	−	−	+	−	−	+	−	−

Table 11.1 (continued)

Botanical taxon	Dominant	Endemic	Locality											
			1	2	3	4	5	6	7	8	9	10	11	12
Primulaceae														
Lysimachia vulgaris L.	✓		−	−	−	−	+	−	−	−	−	−	−	−
Primula elatior Hill.	✓		+	−	+	−	−	−	−	−	−	−	−	−
Primula veris L.	✓		−	−	−	+	−	−	+	−	−	−	−	−
Ranunculanceae														
Aconitum vulparia Rchb.	✓		+	−	−	−	−	−	−	−	−	−	−	−
Actaea spicata L.	✓		−	−	−	−	−	−	−	−	−	−	−	−
Anemone narcisiflora L.	✓		+	−	−	−	−	−	−	−	−	−	−	−
Anemone nemorosa L.	✓		+	−	−	−	−	−	−	−	−	−	−	−
Aquilegia dinarica Beck	✓		+	−	−	−	−	−	−	−	−	−	−	−
Aquilegia grata Zimmeter	✓		+	−	−	−	−	−	−	−	−	−	−	−
Caltha palustris L.	✓		+	−	−	−	−	−	−	−	−	−	−	−
Clematis vitalba L.	✓		−	−	−	−	−	−	−	−	−	−	−	−
Helleborus multifidus Vis.		✓	+	−	−	+	−	−	−	−	−	−	−	−
Helleborus serbicus Adam.	✓		+	−	−	−	−	−	−	−	−	−	−	−
Hepatica nobilis Mill.	✓		+	−	−	−	−	−	−	−	−	+	−	−
Ranunculus thora L.	✓		+	−	−	+	−	−	+	−	+	−	−	−
Thalictrum aquilegifolium L.	✓		+	−	−	−	−	−	−	−	−	+	−	−
Thalictrum minus L.	✓		−	−	−	+	−	−	−	−	−	−	−	−
Trollius europaeus L.	✓		+	−	−	+	−	−	−	−	−	−	−	−
Rhamnaceae														
Rhamnus fallax Boiss.	✓		+	−	−	−	+	−	−	−	+	+	−	−
Rhamnus frangula L.	✓		−	−	−	−	−	−	−	−	−	+	−	−
Rosaceae														
Agrimonia eupatoria L.	✓		−	−	−	−	−	−	−	−	−	−	−	−
Alchemilla hoppeana (Rchb.) Dalla Torre	✓		−	−	−	−	−	−	−	−	+	+	+	+
Alchemilla hybrida Mill.	✓		+	+	+	+	−	+	+	−	+	+	+	+

Table 11.1 (continued)

Botanical taxon	Dominant	Endemic	Locality											
			1	2	3	4	5	6	7	8	9	10	11	12
Aremonia agrimonoides (L.) DC	✓		+	−	−	−	−	−	−	−	−	−	−	−
Aruncus silvestris Kostel. ex Maxim.	✓		−	−	−	−	−	−	−	+	−	−	−	−
Cotoneaster intergerrimus Medik.	✓		−	−	−	+	−	+	−	−	−	−	−	−
Cotoneaster tomentosa Lindl.	✓		−	−	−	−	−	−	+	−	−	−	−	−
Dryas octopetala L.	✓		+	−	−	−	−	−	+	−	+	−	+	−
Fragaria vesca L.	✓		−	−	+	−	+	−	+	−	−	+	−	+
Geum bulgaricum Pančić		✓	−	−	−	−	−	+	+	−	−	−	−	−
Geum coccineum Sibth & Sm.	✓		−	+	−	−	−	−	−	−	−	−	−	−
Geum montanum L.	✓		−	+	−	−	−	+	+	−	+	−	+	+
Geum rivale L.	✓		+	−	−	−	−	−	−	−	−	−	−	−
Geum urbanum L.	✓		+	−	−	−	−	−	−	−	−	−	−	−
Potentilla alpina Dalla Torre	✓		−	−	−	−	−	−	−	−	−	−	−	+
Potentilla recta L.	✓		+	−	−	−	−	−	−	−	−	+	−	−
Potentilla erecta (L.) Räusch.	✓		−	−	−	−	−	−	−	−	+	−	+	−
Potentilla montenegrina Pant.		✓	+	−	−	−	−	−	−	−	−	−	−	−
Potentilla speciosa Willd.	✓		−	−	−	+	−	−	−	−	−	+	−	+
Rosa canina L.	✓		−	+	−	−	−	−	−	−	−	−	−	−
Rosa pendulina L.	✓		−	−	+	−	−	−	−	−	+	+	+	−
Rubus fruticosus L.	✓		−	−	−	−	+	−	−	−	−	−	−	−
Rubus idaeus L.	✓		−	−	−	−	−	−	−	+	+	−	−	−
Sanguisorba minor Scop.	✓		−	−	−	−	−	−	−	−	−	+	−	−
Sorbus austriaca Hedl.	✓		+	−	−	−	−	−	−	−	−	−	−	−
Rubiaceae														
Asperula cynanchi L.	✓		−	−	−	−	−	+	+	−	−	−	−	−
Asperula doerfleri Wettst.		✓	−	−	−	−	−	−	+	−	−	−	−	−
Asperula odorata L	✓		+	−	−	−	−	−	−	−	−	−	−	−

Table 11.1 (continued)

Botanical taxon	Dominant	Endemic	Locality											
			1	2	3	4	5	6	7	8	9	10	11	12
Asperula taurina L.	✓		+	−	−	−	−	−	−	−	−	−	−	−
Gallium cruciata (L.) Scop.	✓		−	−	−	−	−	+	+	−	−	−	−	−
Gallium mollugo L.	✓		−	+	−	−	−	−	−	−	−	−	−	−
Gallium verum L.	✓		−	−	+	−	−	−	−	+	−	+	−	−
Salicaceae														
Populus tremula L.	✓		−	−	−	−	−	−	−	−	−	+	−	−
Salix alba L.	✓		−	−	−	−	−	−	−	−	−	+	−	−
Salix purpurea L.	✓		−	−	−	−	−	−	−	−	−	+	−	−
Salix retusa L.	✓		−	−	−	−	−	−	−	−	+	−	+	−
Salix silesiaca Willd.	✓		−	+	−	−	+	−	−	−	−	−	−	−
Salix viminalis L.	✓		−	−	−	−	+	−	−	−	−	+	−	−
Sapindaceae														
Acer heildreichii Orph. ex Boiss	✓		−	−	−	−	−	−	−	−	−	+	−	−
Saxifragaceae														
Saxifraga montenegrina (Halácsy & Bald.) Micevski & Meyer	✓		+	−	−	−	−	−	−	−	+	−	+	−
Scrophulariaceae														
Digitalis ambigua Murr.	✓		−	−	−	−	−	−	−	−	+	−	−	−
Scrophularia bosniaca G. Beck.		✓	+	−	−	+	+	−	−	−	−	−	−	+
Scrophularia nodosa L.	✓		−	−	−	−	+	−	−	−	+	+	+	−
Verbascum phlomoides L.	✓		−	−	−	−	−	−	+	−	−	−	−	−
Wulfenia baldaccii Degen		✓	+	−	−	−	−	−	−	−	−	−	−	−
Solanaceae														
Atropa belladonna L.	✓		−	−	−	−	+	−	−	+	−	+	+	−
Thymelaeaceae														
Daphne alpina L.	✓		+	−	−	+	−	+	−	−	−	−	−	+
Daphne mezereum L.	✓		+	−	−	−	−	−	−	−	−	−	−	−

Table 11.1 (continued)

Botanical taxon	Dominant	Endemic	Locality											
			1	2	3	4	5	6	7	8	9	10	11	12
Tiliaceae														
Tilia cordata Miller.	✓		−	−	−	−	−	−	−	−	−	+	−	−
Urticaceae														
Urtica dioica L.	✓		−	−	−	−	−	−	−	−	−	−	−	−
Violaceae														
Viola calcarata L. subsp. *zoysii* (Wulfen) Merxm.	✓		−	+	−	−	−	−	−	−	−	−	−	−
Viola orphanidis Boiss. subsp. *nicolai* (Pant.) Valentine		✓	−	−	−	−	−	+	+	−	+	−	−	−
Viola tricolor L.	✓		+	−	−	−	−	−	+	−	−	+	−	−
Xanthorhoeaceae														
Asphodelus albus Willd.	✓		−	−	+	−	+	−	−	−	−	−	−	−

1 Visitor, *2* Bogićevica, *3* Popadija, *4* Karaula, *5* Trojan, *6* Mokra, *7* Čakor, *8* Komovi, *9* Planinica, *10* Sinjavina, *11* Rogamski kom, *12* Gurikulj

11.2.2 Ethnomedical Survey

An ethnomedicinal study was conducted in northern Montenegro because in this area the settlements are more populated than those in the remaining regions of Montenegro. Ninety-four species were reported by more than five informants to be used in traditional medicine by the autochthonous population (Table 11.2). Of these species, *Achillea millefolium* L., *Hypericum perforatum* L., *Rosa canina* L., *Sambucus nigra* L., *Thymus serpyllum* L., *Urtica dioica* L., and *Vaccinium myrtillus* L. were cited by all informants. The most common in traditional usage were Asteraceae (12.1%), Rosaceae (11.2%), and Lamiaceae (6.0%), which is similar to what was reported by Leporatti and Ivancheva (2003) for traditional medicine in Bulgaria and Italy as well as by Šavikin et al. (2013) for the Zlatibor district in Serbia.

Aerial parts of the plants were mostly used (33.3%), followed by roots and rhizomes (23.2%), leaves (17.3%), flowers (10.1%), fruits (6.0%), barks (5.4%), and other (4.7%). A few rare and endangered species such as *Gentiana lutea* L., *Gentiana punctata* L., and *Menyanthes trifoliata* L. were also highlighted by local people in our survey.

The most frequently reported medicinal uses were for treating gastrointestinal (57.4%) and respiratory diseases (41.5%), followed by dermatologic diseases (35.1%), urinary tract ailments (22.3%), diseases of the nervous system and psyche (19.1%), cardiovascular problems (17.0%), rheumatic diseases and gout (11.7%), and gynecological complications (6.4%). Jarić et al. (2007) showed that the largest number of taxa from Kopaonik Mountain in Serbia is used to treat gastrointestinal disorders, while Redžić (2007) reported that in Bosnia and Herzegovina the majority of herbs is being used for treatment of illnesses of respiratory (22%), gastrointestinal (19%), and urinary and genital systems (9%), for treatment of skin conditions (11%), as well as for nervous system conditions and heart diseases (16%). Ivancheva and Stantcheva (2000) reported that the most common use of medicinal plants in Bulgaria was in the treatment of cardiovascular, gastrointestinal, and respiratory disorders similar to the Zlatibor district, Serbia (Šavikin et al. 2013).

More than a half of plants were reported as being only consumed internally (54.3%), 6.4% were only applied externally, whereas 39.4% were reported as being used both, internally and externally. Usage by inhalation was reported only for *Pinus mugo* Turra for respiratory ailments.

During our terrain research, special attention was dedicated to reported species which are less well known as medicinally useful as well as on the less reported usage of some well known medicinal plants. These species are noted in Table 11.2.

According to our ethnopharmacological investigations, the aerial blooming parts of *Hypericum richeri* Vill. are used in traditional medicine of Montenegro in the form of an infusion and an oil extract (Zdunić et al. 2009, 2010). Four quercetin-3-*O*-glycosides, three myricetin-3-*O*-glycosides, 3-*O*- and 5-*O*-caffeoylquinic acid, quercetin, I3,II8-biapigenin, pseudohypericin, and hypericin were identified in our study of *H. richeri* aerial parts (Zdunić et al. 2009). Different oil extracts that we prepared from the aerial parts of *H. richeri* collected from Bogićevica Mountain

Table 11.2 Plant species from Prokletije Mountains used in modern and traditional medicine

Botanical taxa [voucher ID]	Local name(s)	Part(s) used	Indications and usage	LK	F
Adoxaceae					
Sambucus ebulus L. [IP45/06]	*Aptovina*	R, Fr	Gout, rheumatic complaints, edema		III
Sambucus nigra L. [B413/05]	*Crna zova, bazga*	Fl, Fr	Colds, influenza, fruits in diarrhea		IV
Apiaceae					
Astrantia major L. [B12/05]	*Zvjezdina, lisjak*	P	Respiratory tract complaints, bleeding in gastrointestinal tract. Externally, for wounds healing		II
Heracleum sphondylium L. [IP98/07]	*Mečja šapa*	R, AP	Stomach disorders, digestion problems, diarrhea		II
Sanicula europaea L. [B74/05]	*Milogled*	AP	Healing wounds, rashes, chilblains, inflammations of the skin, internal bleeding		II
Aristolochiaceae					
Asarum europaeum L. [B9/05]	*Kopitnjak*	R	Emetics in the treatment of alcoholism		II
Asparagaceae					
Polygonatum odoratum (Mill.) Druce [B19/05]	*Pokosnica*	AP	Joint pain	✓	I
Asteraceae					
Achillea millefolium L. [B295/05]	*Hajdučka trava, stolisnik*	AP	Loss of appetite, dyspeptic complaints, diarrhea, cramps, bleeding hemorrhoids, menstrual complaints, as cholagogue, in preparations for varicose veins. Externally, for inflammation of the skin and mucous membranes		IV
Antennaria dioica (L.) Gaertner [IP24/06]	*Srcopuc*	Fl	Intestinal diseases, gallbladder complaints, diuretic		I
Arctium lappa L. [IP13/06]	*Čičak*	R, L	Cleaning blood, diabetes, sprained legs	✓	I
Artemisia absinthium L. [B322/05]	*Pelin*	R	Asthma, hyperlipidemia	✓	I
Bellis perennis L. [B878/05]	*Bijela rada*	AP	Expectorant, diarrhea and gastrointestinal complaints, disorders of the liver and kidneys. Externally, for wounds healing and skin diseases		III
Carlina acaulis L. [IP32/07]	*Kraljevac, vilino sito*	R	Gastritis, dyspepsia, diseases of the biliary tract. Externally, for dermatosis and to rinse wounds and ulcers		I
Cichorium intybus L. [IP42/06]	*Žućenica, vodopija*	AP, R	Loss of appetite, dyspeptic complaints, and as diuretic		II

Table 11.2 (continued)

Botanical taxa [voucher ID]	Local name(s)	Part(s) used	Indications and usage	LK	F
Eupatorium cannabinum L. [B13/05]	Konopljuša	AP, R	Psoriasis	✓	I
Hieracium pilosella L. [B261/05]	*Runjika*	AP	Wounds, diabetes	✓	I
Inula helenium L. [B98/05]	*Bijeli oman*	R	Psoriasis	✓	I
Matricaria chamomilla L. [B55/05]	*Kamilica*	Fl	Inflammatory diseases of gastrointestinal tract, gastrointestinal spasms, cough, bronchitis, fever and colds; externally, for inflammation of the skin, mouth and pharynx, wounds, and burns		II
Petasites hybridus (L.) P.Gaertn. B.Mey. & Scherb. [IP60/07]	*Lopuh*	L; R	Kidney and bladder stone, respiratory disorders, gastrointestinal disorders, migraine and tension headaches		II
		L, Fl	Water in the stomach, asthma	✓	I
Solidago virgaurea L. [B579/05]	*Zlatnica*	AP	Inflammation of the urinary tract, kidney stone, nephritis, cystitis, gout. Externally, in wounds		I
		AP	Diabetes	✓	I
Taraxacum officinale F. H. Wigg. [B573/05]	*Maslačak, žućenica*	L, R	Lack of appetite, dyspeptic complaints, gall bladder, gout; externally, for eczema and acne		IV
Tussilago farfara L. [B274/05]	*Podbijel*	L, Fl	Catarrh of the respiratory tract with cough		III
		L	Wounds	✓	I
Betulaceae					
Alnus glutinosa (L.) Gaertn. [IP236/09]	*Jova*	Ba	Externally, for inflammation of mouth and pharynx		III
Betula pendula Roth. [B187/05]	*Breza*	L	Bacterial and inflammatory disease of the urinary tract and for kidney stones; externally, for hair loss and dandruff		III
Corylus avellana L. [B416/05]	*Lijeska*	L, Ba, Se	Diarrhea, heavy menstrual bleeding. Externally, for varicose veins and bleeding hemorrhoids		II
		L	Varicose veins	✓	I
Capsella bursa-pastoris (L.) Medik. [IP84/06]	*Hoću-neću, rusomača*	AP	Premenstrual syndrome, mild menstrual irregularities (menorrhagia and metrorrhagia). Externally, for nose bleeds and superficially skin bleeding, wounds, and burns		II

Table 11.2 (continued)

Botanical taxa [voucher ID]	Local name(s)	Part(s) used	Indications and usage	LK	F
Nasturtium officinale R.Br.in Ait. [B560/05]	*Potočarka*	AP	Cough, bronchitis, loss of appetite, dyspeptic complaints; externally, forgingivitis, periodontitis		I
Caprifoliaceae					
Lonicera caprifolia L. [IP159/06]	*Orlove kandže*	Fl	Asthma	✓	I
Valeriana montana L. [B774/05]	*Planinski odoljen*	R	Female sterility	✓	I
Valeriana officinalis L. [B118/05]	*Odoljen, macina trava*	R, Rh	Nervousness, anxiety, restlessness, sleeping problems, irritable bowel syndrome, menstrual problems		I
Caryophyllaceae					
Dianthus knappii Asch. & Kanitz ex Borbás [B61/05]	*Karanfil*	AP	Allergies	✓	I
Cornaceae					
Cornus mas L. [IP116/07]	*Drijen*	Fr	Tonic, mild diarrhea		III
Crassulaceae					
Sedum acre L. [B90/05]	*Žednjak*	AP	Hemorrhoids		II
Sedum telephium L. subsp. *maximum* (L.) Krock [B208/05]	*Bobovnjak*	L	Wounds	✓	I
Cupressaceae					
Juniperus communis L.[B527/05]	*Obična kleka*	Fr	Inflammatory diseases of the lower urinary tract, dyspeptic complaints		IV
Juniperus communis L. subsp. subsp. *alpina* (Suter) [IP109/07]	*Čelak, planinska kleka*	Fr	Inflammatory diseases of the lower urinary tract, dyspeptic complaints		IV
Equisetaceae					
Equisetum arvense L. [B31/05]	*Poljska preslica, rastavić*	AP	As diuretic and spasmolytic for infections of the urinary tract, kidney, and bladder stones; externally, for wounds and burns		III
Ericaceae					
Arctostaphylos uva-ursi (L.) Spreng. [B154/05]	*Međeđe grožđe, uva*	L	Infections of the urinary tract		II
Calluna vulgaris (L.) Hull [B419/05]	*Vrijes*	AP	Prostate diseases	✓	I

Table 11.2 (continued)

Botanical taxa [voucher ID]	Local name(s)	Part(s) used	Indications and usage	LK	F
Vaccinium myrtillus L. [B293/05]	*Borovnica*	Fr, L	Fruit: unspecific acute diarrhea, blood purifier, inflammation of the mouth and throat. Leaves: hyperglycemia		IV
		R	Asthma	✓	I
Fabaceae					
Anthyllis vulneraria L. [B06/05]	*Ranjenik*	Fl	Diuretic, for blood purifying, ulcers, and wounds (internally and externally)		II
Astragalus glycyphyllos L. [B808/06]	*Orlovi nokti*	AP	Potency		II
Melilotus officinalis (L.) Pallas. [B262/05]	*Kokotac*	AP	Chronic venous insufficiency, thrombophlebitis, hemorrhoids; externally, contusions, sprains, blunt injuries		II
Ononis spinosa L. [B611/05]	*Zečji trn*	R	Inflammation of the urinary tract, kidney and bladder stone, gout, rheumatic complaints		III
		R	Cleaning blood	✓	I
Trifolium pannonicum Jacq. [B508/05]	*Djetelina*	AP	Wounds	✓	I
Trifolium pratense L. [B80/05]	*Poljska djetelina*	Fl	Menopausal complaints. Externally, for eczema and psoriasis		III
Fagaceae					
Fagus silvatica L. [IP17/06]	*Bukva*	Pf	Antiseptic, externally for scabies and against dandruff		III
Gentianaceae					
Centaurium erythraea Rafn. [B425/05]	*Kičica*	AP	Dyspeptic complaints, loss of appetite, for diabetes		II
Gentiana asclepiadea L. [IP171/06]	*Trava od utrobice, Trava od žutice, svjećica*	R	Loss of appetite, as a stomachic, component in preparations showing beneficial effects in gall and liver diseases		II
Gentiana cruciata L. [IP32/06]	*Prostijel, sirištara*	R, AP	Loss of appetite, as a stomachic as well as a component in preparations showing beneficial effects in gall and liver diseases		II
Gentiana kochiana Perr. et Song. [B30/05]	*Velemun*	R, AP	Loss of appetite, as a stomachic as well as a component in preparations showing beneficial effects in gall and liver diseases		III

Table 11.2 (continued)

Botanical taxa [voucher ID]	Local name(s)	Part(s) used	Indications and usage	LK	F
Gentiana lutea L. [B250/05]	*Lincura*	R	Loss of appetite, as a stomachic as well as a component in preparations showing beneficial effects in gall and liver diseases		I
		R	Cleaning blood	✓	I
Gentiana punctata L. [B500/05]	*Arnautski raven*	R	Loss of appetite, as a stomachic as well as a component in preparations showing beneficial effects in gall and liver diseases		I
Geranianceae					
Geranium macrorrhizum L. [B42/05]	*Zdravac*	AP	Externally, inflammation of the skin and mucous membranes		III
Geranium robertianum L.[IP64/06, B141/05]	*Zdravac*	AP	Diarrhea, gastritis, inflammatory conditions og gallbladder and its ducts, kidney and bladder; externally, for poorly healing wounds, mild rashes		III
		AP	Sinuses diseases	✓	I
Hypericaceae					
Hypericum maculatum Crantz. [IP52/06]	*Kantarion*	AP	Anxiety, depressive moods, gastritis. Externally, for inflammation of the skin, blunt injuries, wounds, burns		IV
Hypericum perforatum L. [B426/05]	*Kantarion*	AP	Anxiety, depressive moods, gastritis. Externally, for inflammation of the skin, blunt injuries, wounds, burns		III
Hypericum richeri Vill. [HR22M/05]	*Kantarion*	AP	Gastritis, wounds, burns	✓	I
Lamiaceae					
Ajuga reptans L. [IP12/07]	*Krnjavica, ivica*	AP	Gallbladder and stomach disorders; externally, for inflammation of mouth and larynx		II
Betonica officinalis L.[IP26/07]	*Ranilist, ranjenik*	AP	Mild sedative, neuralgia, anxiety, diarrhea, expectorant (coughs, bronchitis, asthma)		II
Calamintha officinalis L. [IP08/06]	*Gorska metvica, verem trava*	AP	Mild sedative, tonic, digestion complaints; externally, for wound healing		II
Nepeta cataria L. [IP28/07]	*Gorka metvica*	AP	Colds, fevers, colics, nervous disorders, migraine		I
Origanum vulgare L. [B432/05]	*Planinski čaj, vranilova trava*	AP	Inflammation of the urinary tract, respiratory disorders, digestive disorders		IV

Table 11.2 (continued)

Botanical taxa [voucher ID]	Local name(s)	Part(s) used	Indications and usage	LK	F
Teucrium montanum L.[IP77/06]	*Trava iva*	AP	Respiratory and gastrointestinal disorders		I
		AP	Cirrhosis	✓	I
Thymus serpyllum [B215/05]	*Majkina dušica*	AP	Gastrointestinal and respiratory disorders (i.e., spasmodic cough)		IV
Menyathaceae					
Menyanthes trifoliata L. [B539/05]	*Grčica, gorka djetelina*	L	Dyspeptic complaints, loss of appetite		I
Oleaceae					
Fraxinus excelsior L.[IP37/06]	*Bijeli jasen*	L	Rheumatism, gout, and as laxative and diuretic		III
Fraxinus ornus L. [B527/05]	*Crni jasen*	Ba	Arthritis	✓	I
Onagraceae					
Epilobium angustifolium L. [B244/05]	*Kiprovina*	AP	Benign prostate hyperplasia and certain micturition disorders		III
		R	Throat cancer	✓	I
Orchidaceae					
Orchis morio L.[B403/05]	*Salep*	R	Cleaning wounds	✓	I
Papaveraceae					
Chelidonium majus L. [IP226/07]	*Rusopas, rusa*	AP	Liver and gallbladder complaints. Externally for skin conditions such as blister rashes, scabies, and warts		II
Pinaceae					
Abies alba Mill. [IP2/06]	*Jela*	Ne; Co	Neuralgia, rheumatism, catarrh of the respiratory tract		II
Pinus mugo Turra. [IP153/06]	*Klekovina bora, bor krivulj*	Ne, Sh	Inhalation in common colds, cough, bronchitis		III
Pinus peuce Gris. [B202/05]	*Molika*	Co	Inflammation of the urinary tract	✓	I
Plantaginaceae					
Plantago lanceolata L. [B86/05]	*Uskolisna, muška bokvica*	L	Common cold, cough, bronchitis, fevers. Externally, for inflammation of the mouth, pharynx, and skin		III
Plantago major L. [B138/05]	*Širokolisna, ženska bokvica*	L	Respiratory disorders, digestive disorders. Externally, for hemorrhoids, inflammation of the skin		III
		R	Toothache	✓	I

Table 11.2 (continued)

Botanical taxa [voucher ID]	Local name(s)	Part(s) used	Indications and usage	LK	F
Plantago media L. [IP27/06]	*Bokvica*	L	Respiratory disorders, digestive disorders. Externally, for hemorrhoids, inflammation of the skin		III
Veronica officinalis L. [B83/05]	*Razgon*	AP	Bronchitis, rheumatic complaints. Externally, for skin diseases and wounds		II
Polygalaceae					
Polygala amara L. [IP212/06]	*Kija, momčić*	R, AP	Cough, bronchitis, gastrointestinal disorders		II
Polygonaceae					
Polygonum aviculare L.[B194/05]	*Troskot*	AP	Skin disease	✓	I
Polygonum bistorta L.[B68/05]	*Srčanik*	Rh, R	Diarrhea, hemorrhoids. Externally, for inflammation of the skin		I
Rumex acetosa L. [B76/05]	*Kiselica*	AP	Mild diuretic		III
		L	Dysentery; bee sting	✓	I
Primulaceae					
Primula elatior (L.) Hill. [B331/05]	*Jaglika*	R, Fl	Cough and bronchitis, as an expectorant, insomnia, anxiety		III
Primula veris L. [IP111/06]	*Jaglika, jagorčevina*	R, Fl	Cough and bronchitis, as an expectorant, insomnia, anxiety		III
		AP	Cleaning wounds	✓	I
Ranunculaceae					
Caltha palustris L. [IP27/07]	*Kopitac*	AP	For dressing and cleansing skin lesions and sores		II
Clematis vitalba L.[B3/05]	*Pavit*	L	Rheumatism	✓	I
Helleborus odorus Waldst. & Kit. [B152/05]	*Kukurijek*	R	Eczema, skin redness, itching	✓	I
Rhamnaceae					
Frangula alnus Mill. [B35/05]	*Krkovina*	Ba	Constipation		I
Rhamnus fallax L. [B51/05]	*Ljigovina, krkovina*	Ba	Obstipation		III
		L, Ba	Itch, wounds	✓	I
Rosaceae					
Agrimonia eupatoria L. [B609/05]	*Petrovac, ranjenik*	AP	Diarrhea, cholestasis, inflammation of kidney and bladder. Externally, for inflammation of the skin, mouth, and pharynx		II

Table 11.2 (continued)

Botanical taxa [voucher ID]	Local name(s)	Part(s) used	Indications and usage	LK	F
Alchemilla vulgaris L. [B495/05]	*Gospin plašt*	AP	Mild and nonspecific diarrhea, menopausal complaints, dysmenorrhea. Externally, for ulcers, eczema, skin rashes		III
Crataegus monogyna Jacq. [B407/05]	*Glog*	L, Fl, Fr	Senile heart, ischemia of the heart, mild forms of bradycardial arrhythmias, as cardiotonic, sedative, and for hypertension		IV
Filipendula ulmaria L. Maxim. [IP47/06]	*Medunika, suručica*	Fl	Cough, bronchitis, fever and cold, for rheumatism of the joints and muscles		III
Fragaria vesca L. [IP12/06]	*Jagoda*	L	Diarrhea, liver diseases		IV
Geum urbanum L. [IP23/06]	*Zečija stopa*	Rh, AP	Digestive complaints, diarrhea, loss of appetite; externally, for gum and mucous membrane inflammations, hemorrhoids		II
Potentilla erecta (L.) Räusch. [IP89/06]	*Srčenjak, trava od srdobolje*	Rh	Diarrhea; externally, for inflammation of the mouth and pharynx and for poorly healing wounds		II
Prunus spinosa L. [IP105/06]	*Trnjina*	Fl, Fr	Common colds, diseases of the respiratory tract, obstipation. Externally, for inflammation of the mouth and pharynx		III
		Fl	Cleaning blood	✓	I
Pyrus pyraster Burgsd. [B28/05]	*Divlja kruška*	L	Prostate disease	✓	I
Rosa canina L. [B418/05]	*Šipurak, divlja ruža*	Fr	Colds, vitamin C deficiency, for disorders of the urinary tract and kidney stones		IV
Rubus fruticosus L. [B761/05]	*Kupina*	L	Diarrhea; externally, for inflammation of the mouth and pharynx		IV
		L, R	Open wounds, periodontal disease	✓	I
Rubus idaeus L. [B332/05]	*Malina*	L, Fr	Diarrhea; externally, for inflammation of the mouth and pharynx		III
		L	Inflammation of the respiratory tract	✓	I
Sanguisorba officinalis L. [IP75/05]	*Lubeničarka, dinjica*	AP	Diarrhea, hemorrhoids, snakebite		II
Rubiaceae					
Asperula odorata L., (Rubiaceae), B10/05	*Lazarkinja*	AP	Mild sedative, gall and liver disorders, expectorants		II

Table 11.2 (continued)

Botanical taxa [voucher ID]	Local name(s)	Part(s) used	Indications and usage	LK	F
Galium verum L. [B37/05]	*Ivanjsko cvijeće*	AP	As diuretic for bladder and kidney irritation, externally for poorly healing wounds		III
		AP	Epilepsy, hysteria	✓	I
Salicaceae					
Salix alba L. [B442/05]	*Bijela vrba*	Ba	Fever, rheumatism, headaches, and pain caused by inflammation		IV
Salix purpurea L. [B443/05]	*Rakita*	Ba	Fever, rheumatism, headaches, and pain caused by inflammation		III
		Br	Hemorrhoids	✓	I
Salix viminalis L. [B213/05]	*Vrba*	Ba	Fever, rheumatism, headaches, and pain caused by inflammation		IV
Scrophulariaceae					
Euphrasia officinalis L. [IP68/07]	*Vidova trava*	AP	Externally, for the inflammation of the eyelids and conjuctiva		II
Scrophularia nodosa L. [B137/05]	*Trava od šapa*	AP	Breast cancer	✓	I
Verbascum densiflorum Bertol. [IP86/06]	*Divizma*	Fl	Catarrh of the respiratory tract, cough, bronchitis		IV
Verbascum phlomoides L. [B614/05]	*Divizma*	Fl	Catarrh of the respiratory tract, cough, bronchitis		IV
Verbascum thapsus L.[IP99/06]	*Divizma*	Fl	Catarrh of the respiratory tract, cough, bronchitis		IV
Verbascum sp. [B614/05, IP99/06]	*Divizma*	L	Acne	✓	I
Solanaceae					
Solanum dulcamara L.[B92/05]	*Paskvica, razvodnik*	Buds	Psoriasis	✓	I
Urticaceae					
Urtica dioica L. [B297/05]	*Kopriva*	R, L	Cleansing tonic and blood purifier, fever, arthritis, anemia, inflammatory diseases of the urinary tract enlarged prostate glands (root); externally, skin complaints, neuralgia, hemorrhoids, hair problems		IV
Violaceae					
Viola odorata L. [IP13/07]	*Ljubičica*	R	Unspecific cough, bronchitis		III
Viola tricolor L. [B603/05]	*Dan i noć*	AP	Bronchitis, whooping cough, rheumatism, cystitis, seborrheic skin, eczema, psoriasis		IV

Table 11.2 (continued)

Botanical taxa [voucher ID]	Local name(s)	Part(s) used	Indications and usage	LK	F
Xanthorhoeaceae					
Asphodelus albus Mill. [B367/05]	*Čapljan*	AP	Psoriasis	✓	I

AP aerial parts, *Ba* bark, *Br* branches, *Co* cones; *Fl* flowers, *Fr* fruit, *L* leaves, *Ne* needles, *Pf Pyroleum fagi*, *R* roots, *Rh* rhizomes, *Sh* shoots, *LK* plant species less known as medicinally useful and the less reported usage of some well-known medicinal plants, *F* frequency based on Braun-Blanquet's V-scale (1965) (*I* 1–5 % of informants, *II* 6–25 % of informants, *III* 26–50 % of informants, *IV* 51–75 % of informants, *V* 76–100 % of informants)

exhibited significant anti-inflammatory and gastroprotective activities in carrageenan-induced rat paw edema test (Zdunić et al. 2010). The same activity was noted for quercetin and I3,II8-biapigenin, which were dominant compounds in the oil extracts (Zdunić et al. 2010). Thus, it could be concluded that these results are a good base for further research that could justify potential usage of oil extracts of *H. richeri* as an antiinflammatory and gastroprotective agent.

In previous ethnomedicinal studies conducted by other authors, Milojević and Mihajlov (1966) reported the application of *Gentiana asclepiadea* L. (cough, tuberculosis), *Polypodium vulgare* L. (heart diseases), *Salvia pratensis* L. (lacerations), *Aconitum variegatum* L. (scabies), *Alnus incana* (L.) Moench (wounds), *Asplenium trichomanes* L. (teeth swelling), *Saxifraga rotundifolia* L. (wounds), *Senecio rupestris* Waldst. & Kit. (rheumatism) in the Prokletije region.

11.3 Phytochemical Investigations

Out of 99 analyzed samples (34 plant species officinal in European pharmacopoeia), 85 correspond to the Ph. Eur. 7.0 regulation. But, in our study, some species, although not used in traditional or official medicine before, were found to be quite interesting in terms of bioactivity. They predominantly belonged to the families Asteraceae and Gentianaceae. Asteraceae is among the principal families whose species accumulate secondary metabolites, e.g., sesquiterpene lactones (SLs), with a vast array of important biological activities. The SLs are a large group of natural products that have been isolated from numerous genera of the Asteraceae family. They are described as the active compounds of various medicinal plants used in traditional medicine and are known to possess a wide variety of biological and pharmacological activities, such as antimicrobial, cytotoxic, and antiinflammatory activities, effects on the central nervous and cardiovascular systems, as well as allergenic potency.

Our examination of the aerial parts of *Achillea clavennae* L., silvery yarrow (Asteraceae), from mountain Komovi afforded eight guaianolides (SLs), three bisabolenes, four flavonols, centaureidin, penduletin, casticin, and artemetin, respectively, sesamin (lignan), and isofraxidin (coumarin; Trifunović et al. 2006). Two guaianolides showed significant cytotoxic effects as well as flavonol centaureidin,

Fig. 11.4 *Gentanella albanica* (Jáv.) Holub

which is already known as a cytotoxic compound. Data concerning the cholagogue, stomachic, and antihelminthic activities of *A. clavennae* originated from the beginning of the seventeenth century (Maggioni and Chiavenna 1953).

The aerial parts of the *Amphoricarpos neumayeri* ssp. *murbeckii* (Bošnjak) (Asteraceae), the highland endemic of the western part of the Balkan Peninusula, inhabiting cracks of carbonate rocks from central Bosnia to northwest Greece, were collected on several localities, such as Canyon of river Tara and mountains Sinjajevina, Komovi, Visitor, Zeletin, and Karanfili (Prokletije). Extensive spectroscopic (^{1}H NMR) and HPLC PDA/ESI MS analysis of the crude extracts and their purified constituents revealed 21 new guaianolide SLs, named amphoricarpolides (Djordjević et al. 2004; Djordjević et al. 2006) as the main constituents (≥1 % per weight of dried plant material). Some of the isolated amphoricarpolides were screened for their cytotoxicity on human cervical cancer (HeLa) and murine melanoma (B16) cell lines, and most of them have shown reasonable cytotoxic activities (Atrrog et al. 2009). Our recent study of biological activity of the surface extract, mostly constituting amphoricarpolides, from the aerial parts of A. *neumayeri* ssp. *murbeckii* from the Canyon of river Tara, also revealed a wide spectrum of antifungal activities (Jadranin et al. 2013).

Tanacetum larvatum (Griseb. ex Pant.) Kanitz. is also rather abundant in the mountains of Prokletije (Visitor, Kotlovi, Trojan), as well at some other mountains in the area (Komovi and Sinjajevina). Quantitative ^{1}H NMR of the crude extracts of the aerial parts revealed high content of the well-known germacranolide parthenolide, up to 2 %, calculated per weight of the dried plant material (Aljančić et al. 2001; Aljančić et al. 2008). This finding was significant because the commercial source of parthenolide, *T. parthenium* (L.) Sch. Bip., is used in traditional and modern medicine for the relief of migraine pain, to help to prevent blood clots, as an antiinflammatory agent providing relief in cases of arthritis, to relieve some types of menstrual problems, and as a digestive aid (Ernst and Pittler 2000).

The Gentianaceae family is well known for its beneficial effects in gall and liver diseases (Blumenthal 1998; Tasic et al. 2004). *Gentianella* species were not previously investigated in Serbia and Montenegro. Thus, in our study, we investigated three species of *Gentianella: G. albanica* (Jáv.) Holub. (Fig. 11.4), *G. crispata* (Vis.) Holub., and *G. bulgarica* (Velen.) Holub. All species were characterized by the presence of three classes of compounds typical for Gentianaceae, such as secoiridoids, C-glucoflavones, and xanthones. The isolated and identified compounds were demethylbellidofolin, bellidifolin, corymbiferin, demethylbellifolin-8-O-glucoside, bellidifolin-8-O-glucoside, corymbifertin-1-O-glucoside, veratriloside, lanceoside, swertisin, campestroside, mangiferin, and isoorientin (Janković et al. 2005).

11.3.1 Possibilities for Sustainable Exploitation and Use of Local Flora

The basic conditions necessary for the correct and economically reasonable exploitation of a plant species include sufficient quantity of raw material; customer demand for the drug; providing space for drying, packing, and storing; good lines of traffic communication; and qualified personnel. Although we have noticed many factors that could be problematic for the sustainable harvest of plants in large quantities, we must distinguish these from the available human resources. In most of the villages visited, young people under the age of 20 were in the minority due to the migration of the younger population to nearby towns and settlements, which has been a growing trend over the past decades. Regardless of the degree of ethnobotanical richness of Montenegro based on the number of plants, migration of young people from the region indicates a potential loss of knowledge of medicinal plant usage in the future. Similar trends have been noticed by Jarić et al. (2007) for mountain Kopaonik and in our later ethnobotanical study in Serbia (Zlatibor district) (Šavikin et al. 2013).

With regards to plant quantity in the examined areas, the conditions for sustainable exploitation may be fulfilled in the case of a large number of herbs. There are some species found only in smaller quantities, but they may also be considered for collecting, especially if they are appreciated and acknowledged by commercial interests as a drug or drug source. According to their quantity, we divided medicinal plants indicated by local people into four groups (1–4). Group 1 includes those found in the largest quantity that could be freely exploited for commercial purposes, such as *Vaccinium myrtillus* L., *Juniperus communis* L. subsp. *alpina*, *Thymus* sp., *Juniperus communis* L., *Achillea millefolium* L., *Urtica dioica* L., *Verbascum* sp., *Sambucus nigra* L., *Rosa canina* L., *Crataegus monogyna* Jacq., *Rubus fruticosus* L., *Salix alba* L., *Origanum vulgare* L., and *Viola tricolor* L.

Group 2 includes those found in relatively lesser quantity, which could be exploited to a lesser but still significant degree: *Primula elatior* (L.) Hill., *Hypericum perforatum* L., *Prunus spinosa* L., *Equisetum arvense* L., *Rubus idaeus* L., *Asperula odorata* L., *Betula pendula* Roth., *Rhamnus fallax* L., *Cornus mas* L., *Alchemilla vulgaris* L., *Viola odorata* L., *Ononis spinosa* L., *Taraxacum officinale* F.H. Wigg., *Epilobium angustifolium* L., *Filipendula ulmaria* (L.) Maxim, and *Fraxinus exselsior* L.

Group 3 includes plants found in limited quantities, which could be exploited only in moderation: *Arctostaphylos uva-ursi* (L.) Spreng., *Agrimonia eupatoria* L., *Centaurium erythraea* Rafn, *Potentilla erecta* (L.) Räusch., *Matricaria chamomilla* L., *Anthyllis vulneraria* L., *Valeriana officinalis* L., and *Solidago virgaurea* L.

Finally, group 4 comprises the rarest plants that are in high demand and should be protected from overexploitation. This group consists of the following species: *Gentiana lutea* L. (found on Visitor mountain), *Gentiana punctata* L. (found in localities Veliki rid, Bogićevica, Visitor), and *Menyanthes trifoliata* L. (found by Plavsko Lake).

Also, although not reported as a medicinal plant used by the local population in the current study, *T. larvatum* (Gris.) Kanitz. could be regarded as a new rich source of parthenolide (Aljančić et al. 2001; Aljančić et al. 2008) that might be harvested to improve economic development for the local populations.

11.4 Conclusion

In conclusion, the abundance of medicinal herbs, in the means of their number and amount on investigated areas, represent a potential source of production for the local population, but this potential is not currently sufficiently utilized. For various reasons, the medicinal herbs and some forest fruits were not collected in potential extent insofar. Our results point out the possibility of creating a new economic branch in this area, but with respect to the principles of sustainable development and good organization.

We have identified areas where the commonly used medicinal herbs can be found, and especially areas with large quantities and a great number of species that might be considered for sustainable exploitation. Consuming and collecting these medicinal herbs are one way to contribute to the national economy and raise the standard of living, especially in economically indigent regions.

The results represented show that there is enough raw material and a large number of plant species in the investigated area to support commercial exploitation on varying levels. The content of active ingredients of plants officinal in Ph. Eur. 6.0. collected on different localities corresponds to requirements for pharmaceutical use for the most part.

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References

Aljančić I, Vajs V, Bulatović V et al (2001) Parthenolide from the aerial parts of *Tanacetum larvatum*. Biochem Syst Ecol 29:655–657

Aljančić I, Vajs V, Tešević V et al (2008) Some wild-growing plant species from Serbia and Montenegro as the potential sources of drugs. Curr Pharm Des 14:3089–3105

Atrrog AAB, Natić M, Tosti T et al (2009) Lipophilicity of some guaianolides isolated from two endemic subspecies of *Amphoricarpos neumayeri* (Asteraceae) from Montenegro. Biomed Chromatogr 23:250–256

Balijagić J, Janković T, Zdunić G et al (2012) Chemical profile, radical scavenging and cytotoxic activity of yellow Gentian leaves (*Genitaneae luteae folium*) grown in northern regions of Montenegro. Nat Prod Commun 7:1487–1490

Djordjević I, Vajs V, Bulatović V et al (2004) Guaianolides from two subspecies of *Amphoricarpos neumayeri* from Montenegro. Phytochemistry 65:2337–2345

Djordjević I, Jadranin M, Vajs V et al (2006) Further guaianolides from *Amphoricarpos neumayeri* ssp. *murbeckii* from Montenegro. Z Naturforsch B Chem Sci 61:1437–1442

Ernst E, Pittler MH (2000) The efficacy and safety of feverfew (*Tanacetum parthenium* L.): an update of a systematic review. Pub Health Nutr 3:509–514

Ivancheva S, Stantcheva B (2000) Ethnobotanical inventory of medicinal plants in Bulgaria. J Ethnopharmacol 69:165–172

Jadranin M, Djordjević I, Tešević V et al (2013) sesquiterpene lactones of *Amphoricarpos autariatus* ssp. *autariatus* from montenegro—antifungal leaf—surface constituents. Rec Nat Prod 7:234–238

Janković T, Krstić D, Aljančić I et al (2005) Xanthones and C-glucosides from the aerial parts of four species of *Gentianella* from Serbia and Montenegro. Biochem Syst Ecol 33:729–735

Jarić S, Popović Z, Mačukanović-Jocić M et al (2007) An ethnobotanical study on the usage of wild medicinal herbs from Kopaonik Mountain (Central Serbia). J Ethnopharmacol 111:160–175

Jovančević M, Balijagić J, Menković N et al (2011) Analysis of phenolic compounds in wild populations of bilberry (*Vaccinium myrtillus* L.) from Montenegro. J Med Plants Res 5:910–914

Lakušić R, Milojević B (1972) Medicinal plants of Prokletije, Komovi and Bjelasica. Tokovi 7:91–110

Leporatti ML, Ivancheva S (2003) Preliminary comparative analysis of medicinal plants used in the traditional medicine of Bulgaria and Italy. J Ethnopharmacol 87:123–142

Maggioni G, Chiavenna N (1953) Bellunese druggist of the sixteenth century and the contested discovery of umbelliferous absinthium (*Achillea clavennae* L.). Minerva Farm 2:267–269

Menković N, Šavikin K, Tasić S et al (2011) Ethnobotanical study on traditional uses of wild medicinal plants in Prokletije Mountains (Montenegro). J Ethnopharmacol 133:97–107

Mihajlov B, Mihajlov M, Tucakov J (1974a) Comparative determination of Arbutoside in the species of genera *Arctostaphylos* Adans. (fam. Ericaceae) and *Vaccinium* Londl. (fam. Vacciniaceae) from the region of Prokletije and Komovi in Montenegro. Tokovi 9:161–174

Mihajlov B, Milojević B, Tucakov J (1974b) Contribution to the pharmacognostic investigations of fruits and essential oil of juniper (*Juniperus communis* L.) from the Prokletije and Komovi area in Montenegro. Tokovi 9:175–184

Milojević B, Mihajlov M (1966) Project report about medicinal plants investigations in the area of Prokletije Mountains and mountains Komovi. Institute for Medicinal Plants Research, Belgrade

Noor Alhamad MN (2006) Ecological and species diversity of arid Mediterranean grazing land vegetation. J Arid Environ 66:698–715

Pulević V (1965) Contribution to knowledge of medicinal plants in the flora of Montenegro, its exploitation and protection. Agric For 11:17–48

Pulević V (1980a) Bibliography of the flora and vegetation of Montenegro. CANU, Titograd

Pulević V (1980b) Review of medical and other useful plant species in the flora of Montenegro, their exploitation and protection. Fund of the Republic Institute for Nature Protection of Montenegro, Titograd

Pulević V (1985) Supplement to bibliography on flora and vegetation of Montenegro. Glasn Republ Zav Zašt Prir Prir Muz Titograd 18:5–94

Pulević V (2005) Materials for Vascular Flora of Montenegro, A Supplementum to "Conspectus Florae Montenegriane"- J. Rohlena, Special editions, vol 2. The Republic Institute for the Protection of Nature Podgorica, Podgorica

Pulević V, Bulić Z (2004) Bibliography of the flora and vegetation of Montenegro, special edition. Republic Institute for Protection of Nature, Podgorica

Radojičić B (1996) Geography of Montenegro—natural ground-plan. Unirex, Nikšić

Redžić S (2007) The ecological aspect of ethnobotany and ethnopharmacology of population in Bosnia and Herzegovina. Coll Antropol 31:869–890

Rohlena J (1942) Conspectus florae Montenegrinae. Preslia 20–21

Stevanović V, Jovanović S, Lakusić D, Niketić M (1995) The diversity of vascular flora of Yugoslavia with the kind of review of international importance. In: Stevanović V, Vasić V (eds) Biodiversity of Yugoslavia with the review of species of international importance. Faculty of Biology and Ecolibri, Belgrade, pp 183–217

Šavikin K, Zdunić G, Menković N et al (2013) Ethnobotanical study on traditional uses of medicinal plants in South-Western Serbia, Zlatibor district. J Ethnopharmacol 146:803–810

Šehić D, Šehić D (2005) National atlas of Montenegro. Daily Press, Podgorica

Trifunović S, Vajs V, Juranić Z et al (2006) Cytotoxic constituents of *Achillea clavennae* from Montenegro. Phytochemistry 67:887–893

Tucakov J, Milojević B, Mihajlov M (1974) The use of plants in the popular medicine in the region of Prokletije and Komovi in Montenegro. Tokovi 9:151–160

Zdunić G, Gođevac D, Šavikin K et al (2009) Isolation and identification of phenolic compounds from *Hypericum richeri* Vill. and their antioxidant capacity. Nat Prod Res 25:175–187

Zdunić G, Godevac D, Milenković M, Šavikin K, Menković N, Petrović S (2010) Anti-inflammatory and gas*troprotective pro*perties of Hypericum richeri oil extracts. Nat Prod Commun 5:1215–1218.

Chapter 12
Ethnobotanical Knowledge and Traditional Use of Plants in Serbia in Relation to Sustainable Rural Development

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12.1 Introduction

12.1.1 General Data on Serbian History and Tradition

Although Serbia is now a diverse multiethnic country with a dominant ethnic Serb population, the notions of the Serbian state (identity and territory) and of Serb ethnicity remain questioned. Byzantine sources report that part of the White Serbs, led by the unknown Archont, migrated southward from their Slavic homeland of White Serbia (Lusatia) in the late sixth century and eventually settled the "Serbian lands" known at present as Serbia, Montenegro, Bosnia, Herzegovina, and Dalmatia. After settling in the Balkans, Serbs mixed with other Slavic tribes and with descendants of the indigenous people of the Balkans: Illyrians, Thracians, Dacians, Celts, Greeks, and Romans (Sedov 1995). Early on, Serbian culture may have been influenced by the Paleo-Balkan people. Conversion of the South Slavs from Paganism to Christianity began in the early seventh century, long before the Great Schism. The Serbian Orthodox Church gained autocephaly from Constantinople in 1219. The Ottoman Empire conquered Serbia in 1459 and placed the country under a state of occupation which lasted for four centuries, the consequences of which suppressed Serbian culture (Zirojević 2007). Serbs speak the Serbian language, a member of the South Slavic group of languages, specifically in the Southwestern Slavic group with the Southeastern Slavic languages, including Macedonian and

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Bulgarian. The Serbian language comprises several dialects. Serbian is the only European language with active digraphia, using both Cyrillic and Latin alphabets. The Serbian Cyrillic alphabet was devised in 1814 by Vuk Karadžić, who created the alphabet on phonemic principles; Cyrillic itself has its origins in Cyril and Methodius (Byzantine Christian missionaries—saints 860–870, during Basil I) transformation from the Greek script. Loanwords in the Serbian language have come mostly from Turkish, German, and Italian; words of Hungarian origin are present mostly in the North, and Greek words mostly in the liturgy (Deretić 2011). Two Serbian words that are used in many of the world's languages are vampire ("vampir") and paprika ("paprika").

The development of the modern Serbian state started in the early nineteenth century on the territory of today's central Serbia, after becoming independent for the first time in the modern era—Principality/Kingdom, 1817–1918 (Jelavić 1983a, b; Glenny 1999).

Modern Serbia is still a rural country, where rural regions occupy about 85% of its territory and 41.8% of the total inhabitants living in 3904 settlements out of the total of 4715 noted for Serbia (http://webrzs.stat.gov.rs/axd/stanovnistvo/izbor.htm). Rural economy to a high extent relies on agriculture, which is the one among few sectors able to generate surplus of more than US$ 1 billion as achieved in 2012 (Group of authors 2013). Despite often being treated as a problem for faster prosperity of the national economy, Serbian rural areas actually represent a huge potential, namely in richness of natural resources out of (agro)biodiversity, cultural and traditional heritage, and ethnobotanical knowledge. In spite of the general globalization trends that strongly jeopardize the agrobiodiversity and the state of genetic resources in Serbia, there is still awareness about the necessity for conservation of indigenous (traditional) knowledge about the uses of plants and preservation of autochthonous and/or old plant varieties, as well as biodiversity in general.

12.2 Traditional Food and Domestic Plant Genetic Resources

In Serbian folk traditions, hundreds of plants were used for ages as foods, beverages, medicines, natural dyes, natural additives, and food preservatives, for textile and fibers, shelter and fuel, as well as for traditional customs, religious purposes, and magical rites. With regards to food, the great variety in Serbia's cuisine originates from its geographical, national, and cultural diversity, and the jigsaw of centuries of population changes. Influences on Serbian cuisine have been rich and varied—it first began as a mixture of Greek, Bulgarian, Turkish, and Hungarian cooking. Historians say that medieval Serbian cuisine mainly consisted of milk, dairy products, and vegetables. Not a lot of bread was eaten, but when it was, the rich ate wheat bread, while the poor ate bread made from oats and rye. The only meat consumed was wild game, with cattle kept for agricultural and dairy use. Beef prosciutto, "kajmak" (traditionally prepared creamy fat cheese), "ajvar" (traditional starter

made from old landraces of paprika, tomato, and eggplant), "cicvara" (a type of polenta made from flour of old corn varieties, eggs, butter, and cheese), rose-petal "slatko" (a sweet preserve), and other specialties made with dried plums are considered as native Serbian foods (http://www.fizio.org.rs/wp-content/uploads/2012/05/Food.pdf, Zagorac 2010).

The considerable genetic diversity of traditional varieties of crops is the most immediately useful and economically valuable part of global biodiversity. Although traditional farming systems are considered as an important part of indigenous rural culture and agrobiodiversity (e.g., Rhoades 1984), many indigenous local populations of agricultural plants have been replaced by high-yielding varieties and hybrids. This has had a direct deleterious effect on genetic variability and led to the erosion of biodiversity, which was also the case in many Balkan countries where a number of old landraces and the local crop's populations disappeared (Lazić and Babović 2008).

Several crop species in Serbia are autochthonous, such as certain cereals, forage grasses, legumes, and some vegetables. Old Slavs had grown a number of agricultural plants, while many more were being domesticated, some of them centuries ago, and the others during recent decades (e.g., soybean and rapeseed). The origin of introduced plant material was mainly related to Turkey, Greece, Germany, Austro-Hungary, Russia, as well as Venice and Dubrovnik. Often, the same species arrived to Serbia from different directions, as indicated by different names for the same species. Frequently, traditional/autochthonous landraces in Serbia were named in accordance with their traits. For example, wheat populations with awns were named "Brkulja" ("Whisker") and without awns "Šišulja" ("Trimmed"). On the other hand, many local populations emphasize its domestic origin ("Domaća raž"—"Domestic rye," "Domaća slačica"—"Domestic mustard," "Domaći kim"—"Domestic caraway"), mainly to highlight the differences from foreign plant material. In many cases, names of local Serbian populations indicate their geographical origin or the area in which they have been grown for a long time (e.g., "Rumski," "Šidski," "Novosadski," "Banatski," "Moravac," "Resavac," "Mačvanski," "Pećanac," "Futoški," "Srpski melez," "Taraški," "Čuruški," etc.). Farmers have different approaches in the naming of local plants. In some cases, they emphasize morphological characteristic of the taxa, while in other cases, they emphasize the country of origin or domesticated name. In practice, farmers combine these terms and give complex names (folk taxa) to the plant populations, such as "Domestic large fruit's gourd" ("Domaća krupnoplodna tikva") or "Nunhems early white cabbage" ("Nunhemski rani beli kupus"), as indicated in the National Program for PGR in Serbia (2012).

12.2.1 Cereals and Vegetables

Today, old/primitive varieties and local/autochthonous populations (landraces) of cereals and maize could be found only on the farmer's fields in marginal agricultural regions and/or in mountain regions. According to recent estimates, no more than

130 of such landraces still exist. One of the most interesting autochthonous wheat landraces is the "spelta," or the "krupnik." "Spelta" (*Triticum spelta* L., syn. *Triticum aestivum* ssp.*spelta* (L.) Thell), representing a husk form of wheat, has been growing in the Balkans and Serbia since ancient times (Prodanović and Šurlan-Momirović 2006). This species is known for its high nutritive value, especially with regards to its high protein and high essential amino acid content, as well as for high concentrations of cellulose, mineral elements (including selenium), and carbohydrates. In addition, grain is appreciated in child nutrition, as well as for the elderly and for those recovering from illness. There are some notes on the use of fresh spelt juice against some forms of cancer, and about its effects in cases of kidney illnesses and different metabolic disorders (Drobnjak 2012). Besides wheat, there are reports on the long tradition of rye, barley, and oat cultivation in Serbia. Barley was used for the production of homemade beer and yeast, while its straw has been appreciated for feeding the livestock. Rye was used (apart from flavor as the other cereals) for making spirits ("rakija") and beer and feeding the poultry, while its straw was used as roof and ground cover. The flavor and texture of oats were known to be very sticky and of bad quality, and its grains and hay were used mainly as horse food. In addition, buckwheat, which was grown in hilly parts of the country, was also appreciated and used as flour, mash, for feeding the poultry, and as an excellent melliferous plant (Radić 1870). Among old and autochthonous maize landraces, the "krivak" (which means crooked, curved), also "osmak" (which means with eight grain rows), and "tvrdunac" (which means hard, solid) might be among the most interesting. It is assumed that it came from Greek merchants (or also from Turks and from Dalmatia) in 1576, being first grown in gardens and later on in the fields (Babić et al. 2012). This variety was namely sown in the hilly and mountainous part of Serbia and was also used as fodder, fuel, shelter, and as an antitussive remedy (using the water in which it was cooked), diuretic, and for wound healing (flour) (Radić 1870).

Concerning genetic resources of vegetables (Vasić et al. 2006; Ćupina et al. 2006), there are regions such as Banat, Bačka, Negotinska Krajina, Pomoravlje, Zapadno-moravski, district Aleksinački, Southern Serbia, and Metohija, where valuable domestic populations of onion ("Kupusinski jabučar," "Kupusinski crni/crveni") can still be found. Domestic populations of leek were found in the South of country. Several local populations of cabbage are well known in Serbia: "Futoški," "Srpski melez," "Varaždinski," "Golubarac," "Kačar," "Katunski," etc. Old local cultivars of pepper are grown in Banat, Bačka, Podrinje, Posavina, Pomoravlje, Eastern Serbia, Negotinska Krajina, Aleksinac District, Southern Serbia, and Metohija and include the "Belopalanačka vrtka," "Venčara," "Niška šipka," "Rutevka," "Strižanka," "Severija," "Turšijara," "Makedonka," etc. Old tomato cultivars and populations are still grown in gardens and farmsteads due to their specific characteristics, most notably, the fruit taste and shape. Old local tomato cultivars (e.g., "Trešnjar," "Pećki jabučar," and "Zlatni plod Timoka") were well recognized in the past, but are now very poorly known, with the exception of the beef heart-type tomato ("Volovsko srce"). Many domestic populations of common bean ("Žutotrban" and "Zeka") are grown on farms in Serbian fields, while landraces,

"Tetovac" and "Gradištanac" (originating from the region along the Danube River in Eastern Serbia) today represent high market classes from Serbia. Domestic populations of lentil are grown in Eastern Serbia (Homolje, Stara Planina, and Suva Planina), Southwestern Serbia (around the Studenica Monastery), Western Serbia (around Požega), and Bačka region. Faba bean landraces ("Krupnozrni" and "Sitnozrni") can be found in the mountains. The most important domestic populations and ecotypes of the Cucurbitaceae family grown in Serbia include "Mramorka" of watermelon, "Cerovača" of the melon "Bundeva," and "Bundevka," "Bela bundeva," "Belokorka," "Bela ludaja," "Bela tikva," "Tikva," "Žuta tikva," "Dulek," "Dudanja," "Ludaja," "Buca," and "Budimka," all from pumpkin species.

12.2.2 Fruits

Fruit species are very widely used by Serbs and in very different ways; this includes consumption of fresh fruits, compote, juices and syrups, fruit tee, "slatko," jam, marmalade, etc. Some popular wild species include different berries (blueberry, blackberry, strawberry, raspberry, etc.), rosehip, hawthorn, dogberry, and some others, which are all readily used as traditional food and/or medicine (Bošnjaković et al. 2012). The most appreciated and consumed fruits in Serbia are apple, plum, and pear (most of the following below was compiled upon review of Savić (2013), Ognjanov et al. (2009), and Keserović et al. (2007)).

12.2.2.1 Apples

Apples have been present in our region since ancient times, and Old Slavs found them already established in the Balkan Peninsula. In the Middle Ages, apples were farmed in river valleys, particularly on monastery and manor grounds. The Balkan region, including the territory of Serbia, is an important gene pool source for autochthonous apple genotypes, which are very important for further diversification of domestic apples (Mratinić and Kojić 1998). Apples are traditionally used as a health food, as medicine and refreshment, and their use is exceptionally important for modern humans. In Serbian tradition, the apple fruit is a symbol of good health, fertility, happiness, prosperity, and good wishes. It is widely used in wedding, engagement, proposal, and birth ceremonies. The most valued old apple varieties are "Petrovača" (The St. Peter's Crown), "Pamuklija" (The Cotton Ball), "Ružica" (The Rosebud), Šarunka (The Motley), "Belojabuka" (The White Bite), "Funtača" (The One-Pounder), "Devojačka crvenka" (The Maiden Blush), "Masnjača" (The Grease Ball), "Krstovača" (The Holy Rod), "Šimširka" (The Hedgehog), "Ovčiji nos" (The Lamb's Snout), "Slatkara" (The Sugar Spice), "Prespanka" (The Prespa), "Kožara" (The Thick-Skin), "Zelenika" (The Greenhorn), "Budimka" (The Budim), "Kablarka" (The Kablar), "Rebrača" (The Frenched Cutlet), and "Senabija" (Oriental Princess).

12.2.2.2 Pears

For many centuries, pears have reached Europe and other continents via Iran and Asia Minor. During the age of feudalism (ninth and tenth centuries AD), pears rapidly spread throughout Europe. Clement of Ohrid (ninth century) and his 3000 students disseminated knowledge on fruit grafting, mostly of apples and pears, throughout the Balkans, and therefore contributed to an increase in the range of many pear varieties in our region (Savić 2013). Just like the apple, during the Middle Ages, the pear was farmed in Serbia only in manor and monastery estates (methos), and only later did they appear on farmers' lands. One of the oldest naturalized varieties of pear, originating from Asia Minor in the Karaman area, is known as "Karamanka" (The Karaman). Until the Second World War, this was the most common pear variety in the region of Serbia, Bosnia, and Macedonia. Presently, it is rare, but it still may be found in the catchment valley of Zapadna Morava region, in Vranje Valley, Toplica, Raška, and Metohija. The fruit is medium sized, pear shaped, and asymmetrical with characteristic pronounced bumps. The flesh of the fruit is yellowish, melting, juicy, and sweet, with a characteristic musky smell. It is suitable for fresh consumption and also for making jam. Apart from this variety, there are also older ones, such as "Jagodarka" (The Strobery Crush), "Vidovača" (The St. Vid's Day), "Ječmenjača" (The Barley-Ripe), "Petrovka" (The St. Peter's Day), "Mirisavka" (The Fragrant Vagrant), "Lubeničarka" (The Watermelon Squirt), "Medunak" (The Honey Pot), "Stambolka" (The Istambul), "Okruglica" (The Belly Ball), "Mesnjača" (The Fleshy Bite), "Jarac" (The He-Goat), "Kaludjerka" (The Monk's Find), "Miholjača" (The Harvest Moon), and "Lončara" (The Pot Belly).

12.2.2.3 Plums

The Slavs have farmed plums on the Balkan Peninsula since their arrival. In the early Middle Ages, plums were first farmed in Serbia as individual trees in monasteries and feudal estates and later also on farmers' land. The Dušan's law from 1349 has, among other aspects of society, regulated fruit farming in the territory of Serbian Empire, particularly in valleys of Zapadna Morava, Ibar, and Lim (Savić 2013). At that time, the most common fruit trees were apples, pears, walnut, mulberry, and sweet chestnut, while intensive farming of plums in Serbia started only in late eighteenth and early nineteenth centuries. Plums are presently the leading fruit crop in Serbia, thanks to suitable climate and soil. Plum is a traditional Serbian fruit, connected to the house and yard. Almost every village house in our region has a plum in the yard or in the orchard. Many settlements in Serbia were named after plum (e.g., Šljivovo, Šljivovik, Šljivovice, Šljivar, Šljivovac, Šljivik, etc., as plum = "šljiva" in Serbian), while many last names (surnames) in the Serbian population were also inspired by this plant (Šljivanac, Šljivar, Šljivić, Šljivo, etc.). The well-known spirit "šljivovica" (slivovitz brandy) that has its origins in Serbia is made from plum and is still traditionally produced in most rural households in Serbia today. Plums are used in their fresh or processed forms (prunes, juice, smooth

Fig. 12.1 Traditional ethnofood from central-west Serbia: homemade bread of buckwheat, "spelta" and domestic rye varieties, apple jam of old "Budimka" variety, and sweet liqueur of wild strawberry. (Original photograph by M. Petrović)

or chunky jam, preserves, in various dishes and sweets). The most pronounced autochthonous varieties of plum are "Ranka" (The Early Bird), "Požegača" (The Pozega), "Belica" (The Whitey Bitey), "Metlaš" (The Belly Ball Plum), "Gorčivka" (The Bitter Truth), "Turgulija," "Govedjača" (The Bovine Gnash), "Moravka" (The Morava), "Magareša" (The Black Donkey), "Bardaklija," and "Pandara."

12.2.2.4 Food Preservation for the Winter

Among the old traditional recipes for special winter fruit preserves ("zimnica") is the sweet drink "Vodnjika," which is prepared from pears (variety "Takiš") and wild apples. After washing and cutting, fruits are dried in the sun and put into the barrels filled with water for some period of time. Thanks to weak fermentation, a mildly (naturally) carbonated sweet drink was made to be consumed in wintertime. Other special foods include sweet cookies made from the "Madzarka" plum and jams made from cooking unpeeled fruits, which were then put onto the cabbage leaves and sun dried for later consumption in wintertime (Savić 2013; Zagorac 2010).

Traditional ethnofood from central-west Serbia is presented in Fig. 12.1.

12.3 History of Ethnomedicine and Medicinal Plants in Serbian Tradition

The history of health culture of the Balkan nations is very complex and interesting, considering the rich cultural and historical past, especially with regard to the strong influences of the Oriental East as well as those of the developed West. As early as the second half of the eleventh century, the Serbs started creating the national culture in the monastery of Studenica, and this process continued and was given

shape in the monastery of Hilandar. This particular period is associated with the beginnings of contemporary European medicine. Having arranged the monastery of Hilandar on the pattern of the hospitals in Constantinople, great Serbian enlightener, Saint Sava began his work of copying medical and biological papers. After he had founded a hospital in the Hilandar Monastery, Saint Sava established the first Serbian hospital in the monastery of Studenica, as the first such institution in the medieval Serbia. One of the most important documents that is kept safe and bear witness to the beginnings of medicine is "The Proceedings of Hodoš," the oldest Serbian codex of secular medicine from the fourteenth century (Katić 1990a). Apart from other things, it mentions the use of various domestic and foreign herbal drugs (most often caraway—*Carum carvi,* aloe—*Aloe vera,* thyme—*Thymus vulgaris,* flax seeds—*Linum usitatissimum,* and coriander—*Coriandrum sativum*). Another important document is "The Hilandar Medical Codex 517 (Anonymous 1989)," which speaks of the use of the camphor tree, iris, hellebore, and many other plants (Tucakov 1997). Other medieval papers on Serbian medicine that should be mentioned include: The Sorcery Book from Dečani, the notes on therapy from the Typikon of the Spellbook No. 54, Bosnian Proceedings, and many others. These proceedings are not the papers on traditional medicine (ethnomedicine). They were written under the influence of European scientific medicine, although up to the Second World War, our scientists adopted the stance that in the Middle Ages, the Serbs had healed themselves by fortune telling and sorcery (Katić 1990b). In the era of the Nemanjić rulers at the beginning of the fourteenth century, the first pharmacy was founded in the most important Serbian port of Kotor. This led to the expanded use of expensive imported drugs and spices from the tropical and subtropical parts of Asia and Africa. Until the downfall of the Serbian medieval countries, Serbian medicine was not very different from the French and Italian medicine, because it was under the mixed influences of both the Mediterranean writers of medicine and physicians from abroad, as well as of the medically illiterate surgeons, warriors, and shepherds. The art of healing, cultivating medicinal herbs, and making remedies was connected to medieval monasteries. The basis of the therapy consisted of 16 holy medicinal herbs that were unfailingly grown in monasteries by monks-physicians: lily—*Lilium* spp., sage—*Salvia officinalis*, rose—*Rosa* spp., fennel—*Foeniculum vulgare*, mint—*Mentha* x *piperita*, fenugreek—*Trigonella foenum-graecum*, savory—*Satureja* spp., rue—*Ruta graveolens*, tansy—*Tanacetum vulgare*, etc. The value of a drug did not depend on its healing properties but on the fact whether the plant had been picked by the left hand, at midnight, on a particular date, whether the person picking it had been silent or singing a special song, yawning, or going backward, etc. (Tucakov 1997). The science of medicinal herbs is not recent, but it is deeply rooted and has a long and continuous tradition in our nation's past.

According to traditional ideas, which often turn into beliefs and superstition, the healing properties and also the poisonous nature of some herbs were the themes of numerous traditional poems (Parojčić and Stupar 2003). The extremely long tradition of the curative and prophylactic use of medicinal herbs with our people is mentioned in the folk medical books of known and unknown authors. These books were written in the period of the Ottoman Turk occupation, when domestic herbal drugs

were the only available raw material for making medicines. The Turkish arrival in the fifteenth century prompted a retreat of the local people into the mountains and monasteries, which contributed to the further development of medicine based on healing herbs and skills related to making curative preparations. Drudgery, poverty, and continuous changes of residence in wartime made herbs exceptionally significant in those days. The enlighteners of the second half of the seventeenth century also wrote about the importance of herbs, their healing power, and dominant use in our tradition. Zaharije Stefanović Orfelin (1726–1785) was one of the first enlighteners from this area who revealed the notions about nature to Serbian people and in his book, *The Big Serbian Book of Herbs*, he described around 500 sorts of plants, giving them both a Latin name and a common name, as well as some valuable information about their use. Apart from this, in his book, *The Experienced Winemaker*, Orfelin offered recipes for preparing herbal wines and other alcoholic and nonalcoholic potions and remedies.

The Old Serbs had a very developed cult of trees and plants. The Serbs were not an exception when compared to other nations, but it is important to say that a lot has been saved until modern times through Orthodox Christianity, stories about folk beliefs, and a practice several centuries long.

12.3.1 Review of the Most Used Medicinal Plants by Serbs

The Old Slavs were familiar with numerous plants, including those they used for healing. They used wormwood (*Artemisia absinthium*) and common centaury (*Centaurium erythraea*) to heal fever, garlic (*Allium sativum*) as an anthelmintic, the castor oil plant (*Ricinus communis*) and devil's turnip (*Bryonia alba*) were used for cleansing, while hellebore (*Helleborus odorus*) and European wild ginger (*Asarum europaeum*) were used as emetics. Sea squill (*Urginea maritime*), asparagus (*Asparagus officinalis*), parsley (*Petroselinum crispum*), and celery (*Apium graveolens*) were used as diuretics, while oak (*Quercus* spp.) and pomegranate (*Punica granatum*) were used as astringents.

As the most widely available and important medicines, herbs played a big role during the Ottoman rule, which is highlighted in the epic poetry of Kosovo and post-Kosovo cycles. Herbs were attributed miraculous and healing properties. Traditional poems show that people were aware of the physiology of plants and their healing and poisonous properties. Numerous lines point out that people knew that poppy (*Papaver* spp.) was an opium used for easing pain, cramps, and other illnesses.

In northern Serbia, people added some plants to wine in order to add hallucinogenic effects. These were plants such as deadly nightshade (*Atropa belladonna*), henbane (*Hyoscyamus niger*), absinthe (wormword)—*Artemisia absinthium*, and American Pokeweed seed (*Phytolacca americana*). Among the poisonous plants mentioned in traditional poems, wormwood had a special place, not only because of its bitterness, but also because of its lethal effects if taken in large quantities ("I plant basil but wormwood grows" are well-known verses from a Serbian

traditional poem). Corn cockle (*Agrostemma githago*) and corn lily (*Veratrum* spp.) are also described as two extremely poisonous plants known to the Serbian people (Čajkanović 1994).

The medicinal plants that are most eagerly celebrated in folk poems are, first, rose as a symbol of beauty, youth, love, and health, then apple as a medicine and raw material. An old Serbian legend says, "Take this pretty red apple, stick four nails in it in the form of a cross and walk to the cross in the village centre while reading The Lord's Prayer three times ten." Some folk poems show the great protective power of valerian (*Valeriana officinalis*), and it was believed that this plant could resist everything. A few drops of the ethereal tincture of valerian put on a lump of sugar or in a glass of water soothed anxiety (Tucakov 1997). Rosemary (*Rosmarinus officinalis*) is a very important plant in the Serbian tradition because it is connected to weddings, and for a long time has been a folk remedy, especially for women. Under the five-century-long Ottoman rule, people did not have their doctors and apothecaries, schools of pharmacy and medicine, and so they passed their knowledge about healing plants from generation to generation through oral poetry. This is the reason why the traditional epic poetry represents an insufficiently revealed treasure that can tell us not only about the medicinal plants that were used but also about the circumstances and illnesses of the time (Spasić 2001).

12.3.1.1 Garlic

Garlic (*Allium sativum*) was one of the most significant folk prophylactics, spices, and also the food of the poor in the history of Serbia. Garlic was trusted more than any other plant. Primordial believing in the healing, protective, and spiritual powers of garlic left an indelible impression on the life of our people. During Lent, garlic was an obligatory side dish, and during the epidemics of typhoid fever, cholera, plague, or dysentery, it was used as a preventive and curative. Serbian people thought that there was no illness that could not be cured by garlic. Thus, it was used in combination with oak bark to cure diarrhea. It was used for contagious diseases, healing the respiratory organs, against coughing, and for troubles with the heart and blood vessels, arteriosclerosis, anxiety, headache, insomnia, and digestive tract. Garlic was used together with pumpkin seeds or combined with thyme, summer savory, and horsemint to fight intestinal parasites. It was often used as a remedy for hair loss, skin diseases, and dental diseases (Pelagić 1974). Although oral, illiterate, and without scientific pretensions, folk medicine has never abandoned garlic and has continually cherished it and passed it on across generations for centuries.

12.3.1.2 Peony

According to the Serbian national tradition, peony (*Paeonia officinalis*) has a special place. Its bright red flowers recall the Battle of Kosovo and the blood of the heroes who perished in the battle, so it has a special meaning to Serbian people,

probably more for its symbolic meaning than for its real healing properties. This flower appears in many epic poems, and ethnomedicine mentions it as a remedy for epilepsy and hysteria, and for whooping cough and hemorrhoids (http://opusteno.rs/lekovito-bilje-f154/lekovito-bilje-bozur-t20192.html).

12.3.1.3 Basil

The leading holy and miraculous plant in Serbian ethnopharmacological tradition used to be basil, and it has remained so today, being cultivated not only in monasteries but also in gardens and pots. This plant was mostly used as a fresh raw material or as a base for making various skin preparations. Some basil-based ointments and balms have been known since ancient times, and it is interesting that particular preparations, such as *Unguentum basilicum*, were called royal balms due to their exceptional importance. Numerous plants taken from Slavic ethnomedicine and ethnopharmacology became part of the scholastic and scientific pharmacotherapy of the Middle Ages through the aforementioned papers in the Serbian language, which appeared in the monastery hospitals of Hilandar, Constantinople, and Studenica (Parojčić and Stupar 2003). Basil tea was used to cure colds, sneezing, bites from snakes and poisonous insects, and plague. From the distant past, people have used it as a sedative and against intestinal gas, flatulence, and digestive problems. Due to its powerful spiritual, magical, and healing properties, this plant has been deeply trusted and loved by Serbian people for centuries (Jacanović and Jacanović 2002).

12.3.1.4 Sweet Flag

An important domestic, medicinal, and aromatic plant, especially in the history of the people from northern Serbia, is sweet flag (*Acorus calamus*). In wartime, it was an important aromatic spice and usually mixed with coriander to make "wartime pepper." Sweet flag is one of the best aromatic and hot plants for stomach and intestines. It is also used as a diuretic, for improving digestion and coughing aide (Tucakov 1997).

12.3.1.5 Yarrow

Our best-known and most widely used traditional remedy is yarrow (*Achillea millefolium*). It is used in folk medicine as a cure for the most diverse illnesses—from healing wounds to problems with the stomach and intestines, and problems with the kidneys and liver. It has often been used for improving appetite, and against asthma and kidney stones (Tasić 2012).

A lot of herbal drugs are used today primarily as raw materials for extracting healing properties (opium poppy, digitalis, ergot fungi, cinchona, ipecacuanha, rauvolfia, etc.). Since the extraction of the first alkaloids up until today, in the period

of almost 200 years, numerous plants have been studied and millions of active components have been extracted, including as many as a few thousands of different alkaloids, although not all of them are used in the modern pharmacotherapy (Parojčić and Stupar 2003).

A review of the most used medicinal plants in Serbian tradition is presented in Table 12.1.

12.3.2 Main Magical Plants in Serbian Tradition

Since ancient times, people worldwide have believed that demons can dwell in plants, animals, rocks, and people. This is why the first days of spring were particularly important to them. Tradition says that spring is the right time to eliminate or at least mollify some of the enemies, such as the demons bringing illnesses, dangers, and possible tragedies to people. Plants have always had a special place in the ritual magic, especially owing to the belief that young, just sprung plants can oppose the evil.

In the past, the Serbs respected the natural surroundings they lived in and believed in the divine power of a number of plants. One of the most important cults that were developed with Serbs was tree worship, which was also dominant with other European nations. Such a relationship with nature, as well as the feeling of reverence for it, is closely related to the natural environment of the European people of the time, whose places of living were encircled by deep forests. Believing in the immortality and eternal life of trees was connected to their appearance and ability to regenerate every year. The property of a tree to enter the earth deep with its root and to seek heights with its aboveground parts represented the axis where the divine world encountered the earthly world and the underworld, the world of the dead. The Old Slavs believed that a tree is the place where the supreme deity, the god of thunder and lightning, Perun (the Thunderer), dwelled. According to some sources, the very name of this highest god means "the forested mountain" or an oak, since the name of Perun originates from Perkwunos (*Perkūnas*) and *perk(w)u* means oak (lat. quercus). Owing to its height, oak (*Quercus* spp.) was often the target of thunders and so was thought to be Perun's dwelling place. Namely, people interpreted the thunder as the coming of gods to the ground. Anyway, in the difficult times that did not miss Serbia, when there were no churches, prayers took place in the open spaces. In these situations, people often looked for protection under the strong branches and a huge crown of an oak tree, into whose bark they would carve a cross. The tradition of old oaks—called the "zapis"—which can be as old as 600 years, has remained until today, and those trunks are considered to be absolutely sacred. Apart from oaks, divine properties were assigned to other deciduous trees: hazel tree, mulberry tree, apple, pear, and especially linden (Fig. 12.2; Radenković 1996).

Table 12.1 Review of the most used medicinal plants in Serbian tradition. (Adapted from Tucakov 1997, Pelagić 1974, and Tasić 2012)

Latin binomial and family	Folk name in Serbian/English	Traditional use—folk use
Agrimonia eupatoria L. Rosaceae	Petrovac/common agrimony	For diarrhea, inflammation of kidneys and bladder
Alchemilla vulgaris L. Rosaceae	Virak/lady's mantle	For mild and nonspecific diarrhea, ulcers, menopausal complaints, dysmenorrheal, eczema, and skin rashes
Anagallis arvensis L. Primulaceae	Vidova trava/scarlet pimpernel	Folk medicine for curing eye diseases
Angelica archangelica L. Apiaceae	Angelika/garden angelica	Has a positive effect on digestive tract, digestion, better appetite
Anthyllis vulneraria L. Fabaceae	Ranjenik/kidneyvetch	Flowers as a diuretic, for blood purifying, ulcers, and wounds
Arnica montana L. Asteraceae	Brdjanka/leopard's bane	Against skin irritation, rheumatism, washing mouth, and as a cure for fever in the seventeenth century
Asarum europaeum L. Aristolochiaceae	Kopitnjak/European wild ginger	Roots as an emetic in the treatment of alcoholism
Galium odoratum (L.) Scop. Rubiaceae	Lazarkinja/woodruff	Aerial parts as a mild sedative, gall and liver disorders, expectorants
Betula pendula Roth Betulaceae	Breza/silver birch	Leaves for bacterial and inflammatory diseases of the urinary tract, and for kidney stones
Calendula officinalis L. Asteraceae	Neven/marigold	Used externally and internally, as an antiseptic and for healing skin diseases
Carum carvi L. Apiaceae	Kim/caraway	Used as a diuretic and a digestive, but often as a spice
Capsella bursa-pastoris (L.) Medik. Brassicaceae	Hoću neću/shepherd's purse	Aerial parts for premenstrual syndrome and mild menstrual disorders. Externally for nose bleeds and superficial skin bleedings, wounds, and burns
Centaurium erythraea Rafn Gentianceae	Kičica/European centaury	Aerial parts for dyspeptic complaints, loss of appetite, and for diabetes
Cichorium intybus L. Asteraceae	Plavocvet/chicory	Aerial parts and roots for loss of appetite, dyspeptic complaints, and as a diuretic
Cornus mas L. Cornaceae	Dren/cornelian cherry	Fruit as a tonic, for mild diarrhea
Crataegus monogyna Jacq. (Rosaceae)	Glog/hawthorn	Leaves with flowers and fruit for senile heart, ischemia of the heart, mild forms of cardiac arrhythmias, as a cardiotonic, sedative, and for hypertension

Table 12.1 (continued)

Latin binomial and family	Folk name in Serbian/English	Traditional use—folk use
Equisetum arvense L. Equisetaceae	Rastavić/field horsetail	Aerial parts as a diuretic and spasmolytic for infections of the urinary tract, kidney, and bladder stones
Filipendula vulgaris Moench Rosaceae	Suručica/meadowsweet	Flowers for cough, bronchitis, fever and cold, for rheumatism of the joints and muscles
Gentiana asclepiadea L. Gentianaceae	Svećica/willow gentian	Roots for loss of appetite, as a stomachic, gall, and liver diseases
Gentiana lutea L. Gentianaceae	Lincura/great yellow gentian	Root for loss of appetite, as a stomachic, as well as a component in homemade preparations showing beneficial effects in gall and liver diseases
Geranium macrorrhizum L. Geraniaceae	Zdravac/big-root geranium	Aerial parts, externally for inflammation of the skin and mucous membranes
Heracleum sphondylium L. Apiaceae	Hogweed	Root and aerial parts for stomach disorders, digestion problems, diarrhea
Hypericum perforatum L. Hypericaceae	Kantarion/tipton's weed	Aerial parts for inflammation of the skin, blunt injuries, wounds, for anxiety, depressive moods, and gastritis
Juniperus communis L. Cupressaceae	Kleka/common juniper	Fruit for inflammatory diseases of the lower urinary tract
Matricaria recutita L. Asteraceae	Kamilica/chamomile	Flowers for inflammatory diseases of gastrointestinal tract, gastrointestinal spasms, cough, bronchitis, fever, and colds. Externally for inflammation of the skin, mouth, and pharynx, wounds, and burns
Ononis spinosa L. Fabaceae	Zečiji trn/restharrow	Roots for inflammation of the urinary tract, kidney and bladder stone, gout, rheumatic complaints
Origanum vulgare L. Lamiaceae	Vranilova trava/oregano	Aerial parts for inflammation of the urinary tract, respiratory disorders, and digestive disorders
Plantago lanceolata L. Plantaginaceae	Bokvica/ribwort plantain	Leaves for common cold, cough, bronchitis, and fever. Externally for inflammation of the mouth, pharynx, and skin

Table 12.1 (continued)

Latin binomial and family	Folk name in Serbian/English	Traditional use—folk use
Plantago major L. Plantaginaceae	Bokvica/broadleaf plantain	Leaves for respiratory and digestive disorders. Externally for hemorrhoids and inflammation of the skin
Polygonum bistorta L. Polygonaceae	Srčanik/bistort	Rhizomes and roots for diarrhea and hemorrhoids. Externally for inflammation of the skin and mucous membrane
Potentilla erecta (L.) Raeusch. Rosaceae	Trava od srdobolje/tormentil	Rhizomes for diarrhea. Externally for inflammation of the mouth and pharynx and for poorly healing wounds
Primula veris L. Primulaceae	Jagorčevina/cowslip	Root and flowers for cough and bronchitis, as an expectorant, insomnia, and anxiety
Prunus spinosa L. Rosaceae	Trnjina/Blackthorn	Flowers and fruit for common colds, diseases of the respiratory tract, and obstipation. Externally for inflammation of the mouth and pharynx
Rosa canina L. Rosaceae	Šipak/dog rose	Fruit for colds, disorders of the urinary tract, and kidney stones
Rosmarinus officinalis L. Lamiaceae	Ruzmarin/rosemary	For strengthening hair root, for skin inflammations
Rubus fruticosus L. Rosaceae	Kupina/blackberry	Leaves for diarrhea. Externally for inflammation of the mouth and pharynx
Salix alba L. Salicaceae	Vrba/willow	Bark for fever, rheumatism, headaches, and pain caused by inflammation
Sambucus ebulus L. Adoxaceae	Burjan/danewort	For rheumatism, used internally and externally
Sambucus nigra L. Adoxaceae	Zova/elderberry	Flowers and fruits for colds, influenza, as a diuretic
Stachys officinalis (L.) Trevis. ex Briq. Lamiaceae	Betony	For healing wounds, burns, for the gastrointestinal tract
Taraxacum officinale F.H. Wigg Asteraceae	Maslačak/dandelion	Leaves and roots for the lack of appetite, dyspeptic complaints, gall bladder, and gout. Externally for eczema and acne
Teucrium chamaedrys L. Lamiaceae	Podubica/wall germander	For digestive organs, gall, vaginal infections, hemorrhoids, and injuries
Teucrium montanum L. Lamiaceae	Trava iva/germander	Aerial parts for respiratory and gastrointestinal disorders
Thymus serpyllum L. Lamiaceae	Majčina dušica/wild thyme	Aerial parts for gastrointestinal and respiratory disorders, spasmodic cough

Table 12.1 (continued)

Latin binomial and family	Folk name in Serbian/English	Traditional use—folk use
Tussilago farfara L. Asteraceae	Podbel/coltsfoot	Leaves and flowers for catarrh of the respiratory tract with cough
Urtica dioica L. Urticaceae	Kopriva/nettle	Roots and leaves as a cleansing tonic and blood purifier, fever, arthritis, anemia, inflammatory diseases of the urinary tract, and enlarged prostate glands (root). Externally for skin complaints, neuralgia, hemorrhoids, and hair problems
Vaccinium myrtillus L. Ericaceae	Borovnica/blueberry	Fruits for unspecific acute diarrhea, as a blood purifier, for inflammation of the mouth and throat, and leaves for hyperglycemia
Valeriana officinalis L. Caprifoliaceae	Odoljen/valerian	Roots and rhizome for nervousness, anxiety, restlessness, sleeping problems, irritable bowel syndrome, and menstrual problems
Verbascum phlomoides L. Scrophulariaceae	Divizma/mullein	Flowers for catarrh of the respiratory tract, cough, and bronchitis
Veronica officinalis L. Plantaginaceae	Razgon/speedwell	Aerial parts for bronchitis and rheumatic complaints. Externally for healing skin diseases and wounds
Viola odorata L. Violaceae	Ljubičica/violet	Roots for unspecific cough, bronchitis
Viola tricolor L. Violaceae	Poljska ljubičica/heartsease	Aerial parts for bronchitis, whooping cough, rheumatism, cystitis, seborrheic skin, eczema, and psoriasis

12.3.2.1 Apple

A very important woody tree in the Serbian folk tradition is the apple tree (*Malus domestica*). An apple is often given as a present or a proof of love and friendship ("You give basil because of its scent, you give an apple because of benevolence," Karadžić 1824). In short stories, a mother, sister, or wife pretends to be sick and wants the hero to fetch them an apple that is hard or impossible to reach, as if it were a completely natural demand. These are mostly mythical apples that grow on trees they do not belong to or that are in the mountains or in the lake guarded by a dragon or some other monster (Čajkanović 1994).

Fig. 12.2 Oak tree "zapis" with herb wreath, recorded in the village Rača, near Kragujevac. (Original photograph by M. Petrović)

According to Serbian tradition, apple trunks are in Paradise, and the first fruits are to be eaten only after St. Peter's Day because on that day, "Saint Peter shook the apples in Paradise." It is believed that if someone ate an apple or played with them prior to that day, hail would fall and destroy crops (Karadžić 1867). As an apple is a symbol of fertility, it appears in many customs related to marriage proposals and weddings. According to the motifs from folk stories, when a young man proposes to a girl, the girl throws apples at her husband-to-be. On the wedding day, wedding guests are not allowed into the girl's house until they shoot an apple stuck on a spear lifted as high above the house as possible.

12.3.2.2 Linden

The Old Slavs considered linden (*Tilia* spp.) to be a holy tree and performed rituals and offered sacrifice to it as if it had been a deity. The Old Slavs gathered honey and wax in linden forests. They also used the nectar from linden trunks for various needs, and built houses and house furnishings from linden wood. Linden is also used for making icons and crosses in churches. According to folk tradition and beliefs, it was the tree of destiny, and so it used to be planted on the day of a male heir's birth (Šulek 1878). Wreaths were made for rituals using leafy branches of linden, oak, and hazel trees. Wreaths were believed to have some magical strength owing to their round shape and the properties of the plants woven into them. They were usually put on doors, thresholds, windows, or the house icon, as well as in gardens, vineyards, stables, and beehives in order to protect the house, cattle, and crops from evil demons (Radenković 1996).

12.3.2.3 Hazel

There are a lot of folk beliefs concerning the hazel tree (*Corylus colurna*) in Serbian tradition. Hazel tree is considered to have extraordinary magical powers and its magic branch can fulfill all our wishes. Hazel tree is also believed to be able to kill the devil, turn a man into an animal, and sometimes even resurrect the dead. Also, the twigs of the hazel tree are used to decorate doors, windows, or cattle pens, and sticks are driven into the earth and left in fields and gardens. There is a custom where a pregnant woman carries a hazelnut in her bosom and, after she gives birth,

puts it in the water where the child has its first bath in order to give him the strength that hazel trees have (Čajkanović 1994). Hazel tree is also a tree of knowledge. In old Serbian schools, the children who did not know the lesson were flogged with a hazel tree rod, certainly in order to make them learn the lesson. Similar to linden, hazel tree has a big importance in the cult, and since it is considered to be a blessed tree, it is used as the living fire to light the first blaze in a new house (Trojanović 1898).

12.3.2.4 Walnut

According to folk beliefs, walnut (*Juglans regia*) is the tree of the underworld, of witches, and evil spirits. This is why people think it is not good to sleep under a walnut tree because one could fall into the eternal sleep. This belief stems from the fact that no plant grows under a walnut tree. If the master of the house cut a walnut tree in front of the house, he would die. In order to prevent illnesses, the sick people would sometimes crawl under the walnut roots saying incantations (Karadžić 1867). There is a custom on Christmas Eve for the master of the house to throw a walnut into each corner of the house (and the household members are not to touch them) as a sacrifice to the deceased.

The tradition says that those who suffer from hemorrhoids should bathe in water full of walnuts and hazelnuts. In eastern Serbia, people use walnut to make amulets believed to protect from evil people, mostly by carving a horn-shaped walnut branch (Jojić Pavlovski 2010). Since early Christianity, icons have been made of walnut wood. In monasteries, walnut leaves are used for dying linen, and such clothes are considered to be blessed and protect the body. The Serbs have a famous remedy for improving male potency; it is made by keeping walnuts in honey for 10 days and then eating them (Đorđević 1958).

12.3.2.5 Basil

Even the well-known Serbian botanist Josif Pančić (1878) noticed that basil (*Ocimum basilicum*) was the plant that the Serbs liked best, even among numerous other prettier and more scented plants, and that it followed people from their birth, when a bunch of basil was put on the pillow of the newborn baby, until their death, when it was planted on the gravesite. As Čajkanović (1994) pointed out, basil had an extraordinarily significant role in not only magic, religion, and cult, but also in the medicine and poetry of the Serbian people. At Epiphany, a dried basil twig is put into the water brought from a spring in the morning. Basil and its pleasant perfume symbolize the benediction of the Holy Spirit. The guests who come to wish Merry Christmas are adorned with basil. A lot of customs are connected to the cult of the dead, so when somebody dies, a bunch of basil is put into their hands, and when going to the graveyard, a bunch of basil is put on the cross. It is believed that the Serbian people managed to avoid the epidemic of plague that devastated Europe in the late Middle Ages because basil twigs were put on tables with food and on wells.

According to Milićević (1894), basil was used to cast spells on the ill part of the body and to purify the water used in doing sorcery, while in eastern Serbia, basil twigs were used for making balms and amulets for scattering evil spirits or for casting spells. In the Serbian language, there is a saying describing a good and pious man: "His soul smells of basil."

One of the most famous basil amulets is made by using a spoon to fill a densely woven linen bag with crushed basil leaves mixed with honey that has previously simmered until the boiling point. While it is heated, the honey is stirred by a basil twig and these words are said: "Sweet honey, give me your sweetness for angels to notice me and bring me all my happiness" (Jojić Pavlovski 2010).

12.3.2.6 Garlic

Since ancient times, garlic (*Allium sativum*) has been thought to be the best means for fighting demons, devils, and spells. The history of this plant is as old as humankind, and it is much respected in ethnomedicine and magic. As Čajkanović (1994) pointed out, witches were frightened of garlic and the people who did not eat garlic were thought to be witches. The advice was to put a wreath of garlic around your neck or on the pillow before going to sleep, and to carry it around your waist during the day because it would stop evil powers (Milićević 1894). Even today, people in eastern and southern Serbia think that wreaths of garlic can protect the home, and so they string garlic bulbs up a red rope and hang them to the right or left of the doorpost.

12.3.2.7 Hawthorn

Apart from other magical characteristics, hawthorn (*Crataegus* spp.) was extremely important as a cosmic tree. According to Čajkanović (1994), hawthorn is a popular weapon when fighting vampires, witches, and evil demons (they mostly represented illness). When vampires are dug up from their graves, as a rule, they are "killed" by piercing a hawthorn stake through them. Incantations and sorcery connected to hawthorn clearly show that a hawthorn tree is the residence of the demons that are capable of sending illness. If there is an epidemic of a disease, a hawthorn stake is stuck in front of the house and all the household members repeat the incantation: "(Of a disease) Come to the stake but do not go further" (Karadžić 1824). Parts of this tree are sewn into clothes or put in a child's cradle and thought to be a reliable protection from witches, vampires, and spells.

12.3.2.8 Wormwood

In religious and magical books, wormwood (*Artemisia absinthium*) is the wizard among the herbs. People in ancient times believed in the power of wormwood and the proof is the name given to it. The old Greek and Latin names are the same and

have the symbolic meaning, "artemisia," after the Greek goddess Artemis, and "absinthe," meaning bitter. There is a Serbian proverb used to describe bad life—"as bitter as wormwood." At the end of the nineteenth century, there were rituals of drinking absinthe, a spirit made from wormwood, in Europe, while in Serbia, there is a tradition of making "pelinkovac," a bitter liquor based on wormwood (Serbian: *pelen* or *pelin*) containing numerous other healing plants. In eastern Serbia, this plant is used for making the amulet for curing migraine.

12.3.2.9 Nettle

The tradition says that nettle (*Urtica dioica*) protects from superior forces and cosmic radiation. There is a familiar ironic saying in Serbian: "The thunder won't strike the nettle" (Karadžić 1867). Also, when the first thunder strikes in spring, people adorn themselves and their houses with nettle to distract the thunder (Čajkanović 1994). In eastern Serbia, nettle is used for removing spells. A nettle stem is put into a bottle of water, and while stirring it, these words are said: "Let this nettle spring he who cast the spell on me." Then the stem is be taken out and put under the pillow to sleep better. In order to be more magical and more feminine, women should wash their faces with the water where nettle has been boiled and repeat: "I stung my face with nettle to get rid of all the rivals" (Jojić Pavlovski 2010).

12.3.2.10 Marigold

Since the time of Egyptian pharaohs until today, marigold *(Calendula officinalis*) has been used not only as an exceptional healing plant but also in various magical rituals. In Serbian folk tradition, marigold is often mentioned in women's traditional love songs. Marigold is picked on the eve of St. George's Day, and along with the Easter egg, it is put in the water that is used for face washing on St. George's Day (Sofrić 1912). It is also used in love magic. A bride brings a bunch of marigold to her husband for him to pine away for her. (In the Serbian language, marigold is called *neven,* and to pine away is *venuti*. This is a pun.) If a marigold grows up for a girl, she will pine away for her sweetheart (Karadžić 1867).

12.3.2.11 Laserwort

"Raskovnik," laserwort (*Laserpitium trilobum*, *Laserpitium siler*), is a plant with many magical properties attributed to it. Its very name shows that this is a plant that can heal (Serbian "*raskiva*") numerous diseases. In addition, raskovnik is thought to be able to unlock (Serbian "*raskiva*") all padlocks and everything closed or locked (a door, a chest, or a fence) and treasure hunters need it to open the treasures (Stefanović 1818). According to Tucakov (1997), the plant's root had anthropomorphic characteristics, and that a head, neck, arms, legs, and eyes could be recognized.

It is used in folk medicine to heal female infertility believed to have been caused by spells. For example, it is thought to be able to remove the magic and spells cast at the wedding (Petrović 1900). According to folk beliefs, the plant "raskovnik" frees trapped and cursed souls (Biljan 1907). In eastern Serbia, "raskovnik" is considered to be the most powerful magical plant that reveals and removes sorceries, protects the house and household members from any kind of evil, helps in settling disputes, brings success in business, happiness in love, and well-being. There is also a legend that the mythical treasure of Tsar Radovan can be reached only with the help of this plant.

12.3.2.12 St. George's Day

One of the most important Serbian holidays is St. George's Day, which represents the holiday of revived nature, when various customs try to transfer its power, mostly the power of the new vegetation, to people, animals, crops, and vineyards. On the eve of the holiday, the mistress of the house takes the Easter egg and puts it in a pot. Around it, she puts different plants: big-root geranium (the symbol of health), cornel (for toughness), and ivy (for daughters-in-law to be devoted to the house). The pot is then filled with water and put under a rose. Immediately after getting up the next morning, the members of the household wash their faces with it.

The Old Serbs had an exceptionally developed cult dedicated to plants and trees. A lot of nations believe in the power of plants, but our people still cherish many of these beliefs today. There is a belief that plants can be put into two groups: good and evil or lucky or unlucky; various sorts: holy, shady, daemonic, godly, and mythical. The cult of plants has an important role in a lot of occasions in our tradition, from birth till death, in numerous jobs (female and male), on working days and holidays, and in different parts of day and night (Kazimirović 1939). It is equally important for celebrations and mourning, love and hate, caring about health and treating illnesses. Our ancestors took care of plants, and in this way, they saved a lot of wisdom.

12.4 Conclusion

Southeast European (SEE) countries located in the Balkans, as one of the world's most biodiverse centers, are known for high floristic diversity, including richness of medicinal plants that have been traditionally utilized by local population for long time in folk and veterinary medicine, as well as in different local products. The number of vascular species of the SEE (Balkan) region could be estimated as about 8000, with very high proportions of endemic plants (more than 2000). The total number of vascular plants growing in Serbia is about 4000, of which 1000–1500 are used as food, medicinal plants, spices, natural dyes, food preservatives, etc. In Serbia, there is a strong and long tradition of plants use for various purposes

originating from ancient times. Nevertheless, traditional use and knowledge about old and autochthonous crop varieties, medicinal plants in folk medicine, and plenty of other economic plants (edible, toxic, natural dyes, natural preservatives and additives, etc.) have not been comprehensively studied and elaborated. Moreover, transitions in Serbian politics and the economy strongly jeopardize the stability and existence of rural livelihoods, especially in the hilly and mountainous regions, where traditional practices and traditional agriculture still exist. Collapse of former cooperatives, lack of crop subsidies and credit access, and destroyed infrastructure provoked a much higher rate of migration towards urban centers beginning in the 1960s, which was also caused by industry expansion under the socialist regime. The consequence is a current and alarming situation that impacts the poorest rural areas that are faced with dramatic aging and depopulation. This may be illustrated by the fact that in Serbia nearly 1200 villages are in the process of vanishing (http://www.politika.rs/rubrike/Sta-da-se-radi/U-nestajanju-je-vise-od-1_200-sela.lt.html). Together with a definite loss of experienced herb collectors and traditional phytotherapists, the ethnobotanical knowledge, old recipes, and many of local brands containing herbs, berries, or mushrooms have been irreversibly lost.

There is an urgent need to preserve the ethnobotanical and ethnopharmacological knowledge of this region because of the permanent drop in the number of herb collectors and diminishing of rural inhabitants in general. Due to the general devastation of rural areas, particularly in hilly and mountainous regions of Serbia (and the Balkans), aging and depopulation processes naturally resulted in loss of substantial data on traditional uses and practices related to useful plants, including old and autochthonous crop varieties (of cereals, vegetables, and fruit) as well as the medicinal and aromatic plants. A comprehensive survey of ethnobotanical knowledge in Serbia and the whole Balkan region is urgently needed to preserve these ancient traditions, which are rapidly disappearing during this period of socioeconomic transition.

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References

Anonymous (1989) Hilandarski medicinski kodex 517 (Hilandar medicinal codex). Narodna biblioteka Srbije, Beograd (National library, Belgrade) (in Serbian)

Babić V, Ivanović M, Babić M (2012) Nastanak i evolucija kukuruza i putevi uvodjenja u nase krajeve (The Origin and Evolution of Maize and its Introduction into South-Eastern Europe). Ratarstvo i povrtarstvo 49:92–104 (in Serbian)

Biljan M (1907) Snaga nekih trava. ZbornÑk za narodnÑ život i obÑčaje XII, Zagreb (Strenght of some herbs. Proceedings for folk life and tradition, Zagreb) (in Croatian)

Bošnjaković D, Ognjanov V, Ljubojević M, Barać G, Predojević M, Mladenović E, Čukanović J (2012) Biodiversity of wild fruit species of Serbia. Genetika 44/1:81–90

Čajkanović V (1994) Rečnik srpskih narodnih verovanja o biljkama. Sabrana dela iz srpske religije i mitologije 4. Prosveta, Beograd (Dictionary of folk beliefs on plants. Compiled works from Serbian religion and mitology, Belgrade) (in Serbian)
Ćupina B, Mihailović V, Mikić A, Tomićć Z, Vasiljević S (2006) Genetic resources of annual forage legumes in Serbia. IPGRI Newsletter for Europe 33:16
Deretić J (2011) Kulturna istorija Srba. (Cultural history of Serbs). Evro Guinti publisher, Belgrade (in Serbian), p 348
Đorđević TR (1958) Priroda u verovanju i predanju našega naroda. Srpski Etnografski Zbornik I-II (LXXII) (Nature in beliefs and tradition in our folk. Serbian ethnology proceeding I-II (LXXII)) (in Serbian)
Drobnjak G (2012) Less cultivated field crops: krupnik (spelled). Aktuelni savetnik: "Preservation and development of biological and genetic diversity" 1(10):7–11. PSS Ruma d.o.o. Ruma, R. of Serbia (in Serbian, English abstract)
Glenny M (1999) Balkans 1804–1999. Nationalism, war and the great powers. Granta, London
Group of authors (2013) Conclusions from the scientific meeting: "Prospects of Serbian village development", Serbian Academy of the Sciences and Arts (SANU), Belgrade, pp. 17–18 April 2013
Jacanović D, Jacanović M (2002) Farmakološko-medicinski aspekt biljaka—simbola zdravlja u tradicionalnoj kulturi. Timočki medicinski glasnik, Glasilo Podružnice Srpskog lekarskog društva, 27(1–4), Zaječar. English edition: Jacanović D, Jacanović M (2002) Pharmacological-medicinal aspect of plants—symbols of the health in traditional culture. Timok medical bulletin of Depertment of Serbian medical society (in Serbian)
Jelavić B (1983a) History of the Balkans: eighteenth and nineteenth centuries, vol 1. Cambridge University Press, Cambridge
Jelavić B (1983b) History of the Balkans: twentieth century, vol 2. Cambridge University Press, Cambridge
Jojić Pavlovski J (2010) Magija biljaka—i lek i amajlija. Gorgon, Beograd (Magic of plants—both remedy and amulet. Gorgon, Belgrade) (in Serbian)
Karadžić V (1824) Narodne srpske pjesme. Lipisca (Folk Serbian lyrics. Lipisca) (in Serbian)
Karadžić V (1867) Život i običaji naroda srpskoga. Beč (Life and customs of Serbian folk. Venna) (in Serbian)
Katić R (1990a) Medicinski spisi Hodoškog zbornika. Dečije novine, Gornji Milanovac (Medical letters of Hodos proceedings, Dečije novine, Gornji Milanovac) (in Serbian)
Katić R (1990b) Srpska srednjevekovna medicina. Dečije novine, Gornji Milanovac (Serbian medieval medicine. Dečije novine, Gornji Milanovac) (in Serbian)
Kazimirović R (1939) Tajanstvene pojave u našem narodu, Knjizarnice Milorada Milanovic Beograd (Mystery phenomena in our folk, Knjizarnice Milorada Milanovic Belgrade). (in Serbian)
Keserović Z, Gvozdenović D, Cindrić P, Paprić DJ, Korać N, Ognjanov V et al (2007) Scientific and research work at the Institute for fruit growing and viticulture in Novi sad (1947–2007). Contemporary agriculture 56:1–17 (in Serbian, abstract in English)
Lazić B, Babović J (2008) Organska poljoprivreda. Institut za ratarstvo i povrtarstvo Novi Sad (Organic agriculture. Institute for field crops and vegetables, Novi Sad, R. of Serbia). (in Serbian)
Milićević MĐ (1894) Život Srba seljaka. Srpski Etnografski Zbornik I, Beograd (Life of Serbian peasants. Serbian ethnology Proceeding I, Belgrade) (in Serbian)
Mratinić E, Kojić M (1998) Samonikle vrste voćaka Srbije. Institut za istraživanja u poljoprivredi Srbija, Beograd (Wild fruit species of Serbia. Agricultural research institute of Serbia, Belgrade) (in Serbian)
Ognjanov V, Keserović Z, Mratinić E, Miletić R (2009) Fruit germplasm in Serbia. In: Proceedings of the scientific meeting on the management of genetic resources of plant and animal species in Serbia, Belgrade, pp 89–99 (in Serbian, abstract in English)
Pančić J (1878) Flora u okolini Beogradskoj po analitičnoj sistemi. (Flora in vicinity of Belgrade by the analytical system). Državna štamparija, 472 pp (in Serbian)
Parojčić D, Stupar D (2003) Istorijski osvrt na lekovito bilje i njegovu upotrebu u farmakologiji. Glasilo Podružnice Srpskog lekarskog društva, 28(3–4), Zaječar. (Historical review on

medicinal plants and its use in pharmacology. Bulletin of Serbian medical society 28(3–4), Zaječar) (in Serbian)
Pelagić V (1974) Pelagićev narodni učitelj (Pelagić's national teacher). Sloboda, Beograd (in Serbian)
Petrović VK (1900) Zaplanje ili Leskovačko u Srbiji. Narodni život i običaji. ZbornÑk za narodnÑ život i obÑčaje V, Zagreb (Zaplanj or of Leskovac in Serbia. Folk customs and tradition. Proceedings for folks and tradition, V, Zagreb) (in Serbian)
Prodanović S, Šurlan-Momirović G (2006) Biljni genetiči resursi za organsku poljoprivredu (ur. M. Urošević). Poljoprivredni fakultet Univerziteta u Beogradu (Plant genetic resources for organic agriculture. In: Urošević M (ed) Faculty of Agriculture, University of Belgrade, R. of Serbia (in Serbian)
Radenković Lj (1996) Simbolika sveta u narodnoj magiji Južnih Slovena. Balkanološki Institut SANU, Prosveta, Niš, pp 386 (Symbolism of the world in folk magic of South Slavs. Institute for Balkan research of Serbian academy of sciences and arts, SANU, Prosveta, Niš) (in Serbian)
Radić Đ (1870) Gajenje poljskih useva (Cultivation of field crops), Društvo za poljsku privredu, Beograd (in Serbian)
Rhoades RE (1984) Breaking new ground: agricultural anthropology. CIP, Lima
Savić A (2013) The old and gone fruit of Serbia. Natural history museum and Serbian academy of sciences and arts, gallery of science and technology, Belgrade
Sedov SS (1995) Slavyane v rannem srednevekovie. Archaeological institute of Russian Academy of Sciences, Moscow (in Russian)
Sofrić P (1912) Glavnije bilje u narodnom verovanju i pevanju kod nas Srba. Po Angelu de Gubernatis. Sakupio i sastavio Niševljanin (Pavle Sofrić), Beograd (Main herbs in folk beliefs and poems in us Serbs. Upon Angel de Gubernatis. Collected and edited by Pavle Softic from Nis, Belgrade) (in Serbian)
Spasić N (2001) Srpska čudesa. Metaphysica, Beograd (Serbian miracles) (in Serbian)
Stefanović V (1818) Srpski rječnik istolkovan njemačkim i latinskim riječma, Beč (Serbian dictionary added with German and Latin words, Venna) (in Serbian)
Šulek B (1878) Zašto Slaveni poštuju lipu, Rad, 43:1–40 (Why Slavs respect linden) (in Serbian)
Tasić S (2012) Ethnobotany in SEE-WB countries—traditional uses of indigenous plants. Lek Sirov XXXII(32):71–81
Trojanović B (1898) Lapot i prokletije kod Srba. Radikalna štamparija, p 38 (Curses and anathemas in Serbs) (in Serbian)
Tucakov J (1997) Lečenje biljem. Rad, Beograd (Healing with herbs) (in Serbian)
Vasić M, Mihailović V, Mikić A, Gvozdanović-Varga J (2006) Faba bean (Vicia faba L.)—past, present and future. Proceedings of the International EKO-conference safe food, Novi Sad, Serbia, pp 331–336
Zagorac D (2010) Gastronomska mapa Srbije. Zavod za istraživanje kulturnog razvoja Srbije, Beograd (Gastronomic map of Serbia. Department for research of cultural development of R. of Serbia, Belgrade) (in Serbian)
Zirojević O (2007) Srbija pod turskom vlašću 1459–1804. Srpski genealosÌki centar, Beograd (Serbia under the Ottoman Empire occupation) (in Serbian)

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