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.

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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

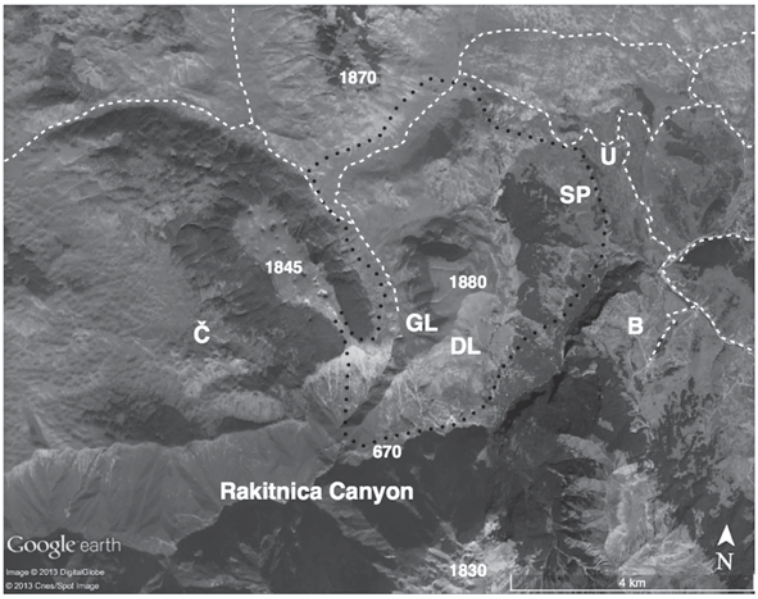

Fig. 2.1 Lukomir and nearby villages in the Bjelašnica region of Bosnia and Herzegovina. Taxa in Table 2.1 were collected within *black dotted perimeter* (~26 km^2). *White dashes* indicate roads leading to Lukomir. *Numerals* indicate meters above sea level (m.a.s.l.). Bobovica (*B* = 1300 m.a.s.l.), 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: