Plant ethnomedicine in Bosnia and Herzegovina, past and present

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Research

Abstract

Background: Bosnia and Herzegovina (BIH) belongs to the group of Western Balkan and Mediterranean countries. Its specific geographical position and numerous refugial habitats are responsible for today's remarkable plant biodiversity. The Biocultural diversity of this area originated in the Stone Age, additionally enriched by the influence of various conquerors: Slavic tribes, the appearance of the Franciscans, the Ottoman Empire, the arrival of Sephardic Jews, and the Austro-Hungarian Monarchy.

Methods: The diachronic changes in the use of medicinal plants in BIH from the Middle Ages until today were studied. In this research, 1211 randomly selected respondents of different ages, genders, and levels of education participated. Frequency (FC) and the relative frequency of citation (RFC), therapeutic use, number of use reports (UR) and the family importance value (FIV) were used to evaluate the relevance of detected species and families.

Results: In daily life practices, respondents utilize about 145 plant species for medicinal purposes, mainly as an infusion, herbal juice, tincture, syrup, and oil. The ethnobotanical bibliography for the region of BIH includes 43 references published so far. According to them, current healers and the local population no longer use about 21% or 60 plant species from 55 genera and 40 families. Also, the ways of application changed, while the ritual uses entirely vanished.

Conclusions: Diachronic changes in traditional medicine in BIH resulted in a decrease in indigenous knowledge about autochthonous medicinal plant species. Native plant resource funds stay neglected while current local connoisseurs and people frequently utilize commonly known innovative medicinal plants.

Keywords: Traditional knowledge, Medicinal plants, BIH

Background

The Biocultural diversity of Bosnia and Herzegovina (BIH) originated in the Stone Age. The oldest findings about the use of plants in Bosnia and Herzegovina are related to human remains from the Neolithic period. Paleoethnobotanical research of northern Bosnian locality shows that the Illyrian community of Japods from the Ripač settlement cultivated and used 31 plant species (Beck 1896, Benac 1951, Woldřich 1896). The author separates the species into several groups: three types of cereals (*Triticum dicoccon* /Schrank/ Schübl., *Hordeum sativum* Jess., *Panicum miliaceum* L.), three legumes (*Vicia faba* L.,

Lens esculenta Moench, *Pisum sativum* L.), ten different types of fruit (*Malus communis* Lam., *Pyrus communis* L*., Cornus mas* L., *Prunus avium* /L./ L., *Prunus spinosa* L., *Prunus domestica* L., *Vitis vinifera* L., *Rubus idaeus* L., *Ceratonia siliqua* L., *Corylus avellana* L.), 16 weeds species (*Festuca* spec., *Polygonum mite* Shrank, *P. lapathifolium* L., *Amaranthus blitum* L.,*Ranunculus repens*, *R. sardous* Crantz, *Daucus carota* L., *Agrimonia eupatoria* L., Malva neglecta Wallr, *Vicia hirsuta* /L./ Gray, *V. sepium* L., *Lathyrus latifolius* L., *Physalis alkekengi* L., *Convolvulus arvensis* L., *Veronica hederifolia* L., *Valerianella rimosa* Bastard) and the species *Staphyllea pinnata* and *Querqus robur* not classified in any category. The second settlement from central Bosnia (Okolište) was related to the culture of the group Desidijats. The paleoethnobotanical study by Kučan *et al.* (2006) shows that this culture knew and found a use for five types of cereals, 15 weeds, three types of fruits, and two plants from the Fabaceae family. Few more studies report similar findings in several Neolithic settlements (Hopf 1966/1967, Kučan 1984, 1995, Maly 1904, Truhelka 1904). The authors of these studies do not particularly underline the method of usage of these plant species or their medicinal application.

New perceptions about medicinal plants arrived with the Roman conquerors, especially their military veterans who came as colonists to this area at the beginning of the new century. But the first significant impact on the Biocultural biodiversity of Bosnia and Herzegovina came with ancient Slavs in the 6th century based on their Vegetative-animistic concept of belief. Among the oldest manifestations of the ancient Slavs cult is the respect of individual trees and forest vegetation as the residence of the Gods or recognition of trees as the gods themselves. Slavs dedicated the Oak tree to the supreme god Perun, the Ash to the god Svetovid, the Linden to the goddess Vida, and the Birch to the harvest god Potrimba. The ancient Slavs also believed in the medicinal power of other wild plants: Dogwood, Willow, Hazel, Yew, Mistletoe, Lilac, Beech, Pine, and Mediterranean cypress. They cultivated a large number of plant species for food and medicinal treatment. In the orchards, they grew: Walnuts, Apples, Plums, Quinces, Pears, Medlars, Cherries, and Sour cherries. They cultivated in the gardens: vegetables: Beans, Peas, Cabbage, Garlic, Lentils, Melons, Onions, Carrots, Turnips, and Pumpkins, or grew textile plants: Flax and Hemp (Kulišić 1979).

The first written traces of medicinal plant usage in Bosnia and Herzegovina are related to the arrival of the Franciscans and the establishment of the Franciscan Order in 1209. Their missionary activity included the treatment of the local population. Some of the oldest written traces of traditional healing are preserved in the folk recipe collections named **Ljekaruša**, thanks to the Franciscan friars from this area. These manuscripts contained recipes for the human/veterinary medical practice made from medicinal plants, animal organs, parts of the human body, and body fluids, as well as usage instructions (Kovačević-Kojić 1983, Mandić & Tomić 2020). The oldest manuscripts dating from the 13th century are mainly lost.

With time, saved collections of folk recipes were supplemented with new ones. Along with the traditional knowledge of the ancient Slavs, Romans, and Franciscans, new ones were coming with the arrival of new cultures during the 15th century. The first was the Ottoman conquerors and then the Sephardic Jews who immigrated from Spain and Portugal in the late 15th and early 16th centuries. Therefore, numerous manuscripts were in different languages: Latin, Gothic, Bosnian and Cyrillic, Italian, and German. These folk recipe collections are usually named after the collector or transcriber or according to the place of origin and stored in monasteries, libraries, or private libraries (Karamatić 1984).

During this period, there were well-known shops of traditional and herbal drugs called Attar stores with medicinal herbs sold in boxes with inscriptions in Hebrew, Turkish and Bosnian. The first pharmacy was built and endowed by Junuz-beg in 1514., in the City of Sarajevo. These pharmacies were popular, so Sarajevo had a large Pharmacy market named **Atarska čaršija**. The oldest preserved Attar pharmacy, about 350 years old, belonged to the Jewish family Papo (Omanic *et al.* 2008; Sućeska 1995). It was closed in 1942, and today it is exhibited in the Jewish Museum in Sarajevo (Fig. 1).

For many years, ethnobotanical research in these areas was devoted to recognizing and re-actualization of these healers and their manuscripts. The first ethnobotanical work in this region gives an overview of recipes about medicinal plants from 1749 (Truhelka 1889). It followed by others that directly reproduced the content of the **Ljekaruša** or other sources of traditional knowledge from the mentioned period (Bratić 1903, Bratić 1908, Dragićević 1909, Fabijanić 1975/1976, Fazlagić 1894, 1895a,b, Filipović-Fabijanić 1964, Filipović-Fabijanić 1968, Filipović-Fabijanić 1969/1970, Filipović-Fabijanić 1971, Glück 1892a,b, Kulinović 1898, Medić 1904a,b, Zovko 1890). New ethnobotanical studies are focused on traditional knowledge of local healers (the local name *travari)* from small communities of highlanders or other settlements throughout Bosnia and Herzegovina (Ferrier *et al.* 2015, Ginko *et al.* 2023, Redžić 2007, 2010, Šarić-Kundalić *et al.* 2010a,b, 2011, 2015, 2016).

This research focused on diachronic changes in the use of medicinal plants in Bosnia and Herzegovina from the Middle Ages until today. It includes changes in the knowledge of current practitioners of traditional healing methods, but also local people who do not directly deal with it.

Figure 1. Attar/herbalist store in Sarajevo by the Papo family, 350 years old (Jewish Museum in Sarajevo)

Materials and Methods

Study area

Bosnia and Herzegovina (BIH) is a Southeast European country from the Balkan Peninsula with a total surface area of 51.209 km² (42° N and 45° N and 15° E and 19° E). The country belongs to the Mediterranean (Adriatic Basin) and the Danubian countries groups (Black Sea Basin). The land is mainly hilly to mountainous, with a chain of Dinaric Alps extending along the coast from the northwest to the southeast. Three climatic zones: a temperate continental (northern part of the country), alpine (the mountain regions), and a Mediterranean (coastal and lowland areas of the Herzegovina region in the south and southeast), can be recognized. Its specific geographical position and numerous refugial habitats, left behind after the glacial period, were responsible for recent remarkable plant biodiversity. Redžić *et al.* (2008) report 5.200 taxa of higher plants with 10% of endemics.

According to the last census, BIH has 3.531.159 inhabitants (51% women) and over 57% living in rural areas. The average age of residents is 39.5 years, and the population over 65 comprises 14.2% of the total (Ćorović *et al.* 2022).

Methods for Data Collection

This five-year (2015-2020) survey included 1211 respondents, randomly selected from urban and rural areas of Bosnia and Herzegovina, without special traditional knowledge and skills (Fig. 2).

Figure 2. Geographical position of Bosnia and Herzegovina and marked, with squares, researched areas

The research included wild medicinal plants that the respondents collected and prepared themselves. Cultivated and non-native species were excluded from the questionnaire.

The informants were acquainted in detail with all aspects of the research and agreed to give prior consent to participate. All aspects related to the questionnaire and interviewing the informants followed the instructions of the International Society of Ethnobiology Code of Ethics (ISE 2006).

The personal data of respondents: gender, age, education, occupation, and place of residence, were included in the informative part of the questionnaire The general section comprised botanical information (the local name of the plant and part of the plant used) and uses of the plant (the name of the disease, method of preparation, and dosage). Medicinal plants (Electronic Supplementary Material 1) were identified according to Floras (Beck 1903-1927, Beck & Maly 1950, Beck *et al.* 1967) and deposited in the Laboratory for research and protection of endemic resources. The nomenclature follows http://www.europlusmed.org.

Data Analysis

The main variables of the data in Electronic Supplementary Material 1 provided the following information for each taxon: scientific names of plants in alphabetical order, family name, vernacular name of taxa, parts of the plant used, frequency of citations (FC), the relative frequency of citation (RFC), therapeutic use, number of use reports (UR), mode of utilization and dosage.

The level of awareness of each taxon among the respondents was determined by relative frequencies calculated using the following formula RFC = FC/N, where RFC represented the relative frequency of citation, FC the absolute frequency or number of mentions of a single taxon, and N was the total number of informants (Tardío & Pardo-de-Santayana 2008). The RFC ranged from zero (when no one mentions a plant as helpful) to one (when all informants consider a specific species useful).

The family importance value (FIV) defined the local importance of a family and was calculated by the formula FIV=FC (family)/ N×100, where FC was the number of respondents who mentioned family, and N was the total number of respondents who participated in the survey (Nadaf *et al.* 2019, Vitalini *et al.* 2013).

Results

The present use of wild ethnomedicinal plants by the local population

Informers from the entire area of BIH, who were not active transmitters of traditional knowledge, were enclosed in this research. Demographic data included gender, age, and education. The 1211 respondents participated in the study, of which 75.80% were women and 24.19% were men. Respondents between 50s and 60s were the most represented in the survey (33.36%), followed by the group aged 40-50 (19.49%). The majority had a secondary education profile, 703 (58.05%), 290 (23.95%) a higher education that included knowledge about medicinal plants, and 18% of respondents had primary education.

Ethnobotanical data, scientific name, family, vernacular name, part(s) of utilization, frequency of citation (FC), relative frequencies (RFC), therapeutic use, number of use reports (UR), mode of utilization, and dosage are represented for each plant species in Electronic Supplementary Material 1. Our results showed that respondents used 145 plant species from 56 families. The most commonly utilized families, based on the number of species, were Lamiaceae (20), followed by Compositae (19), Rosaceae (14), Fagaceae (9), Apiaceae (5), Cupresaceae and Ericaceae (4), and Anacardiaceae, Boraginaceae, Gentianaceae, Malvaceae, Primulaceae (3). The other families had a lower number of species.

The local importance of the families of wild species presented by the family importance value (FIV) didn't correspond entirely with the number of species listed within the family. The following graphic represented 21 families with the highest FIV (Fig. 3). Herein, Lamiaceae, Compositae, and Rosaceae had dominant family importance values. They are followed by the family Urticaceae, cited by 148 respondents, and presented only with two species (*Urtica dioica* FC=141 and *Parietaria officinalis* FC=7).

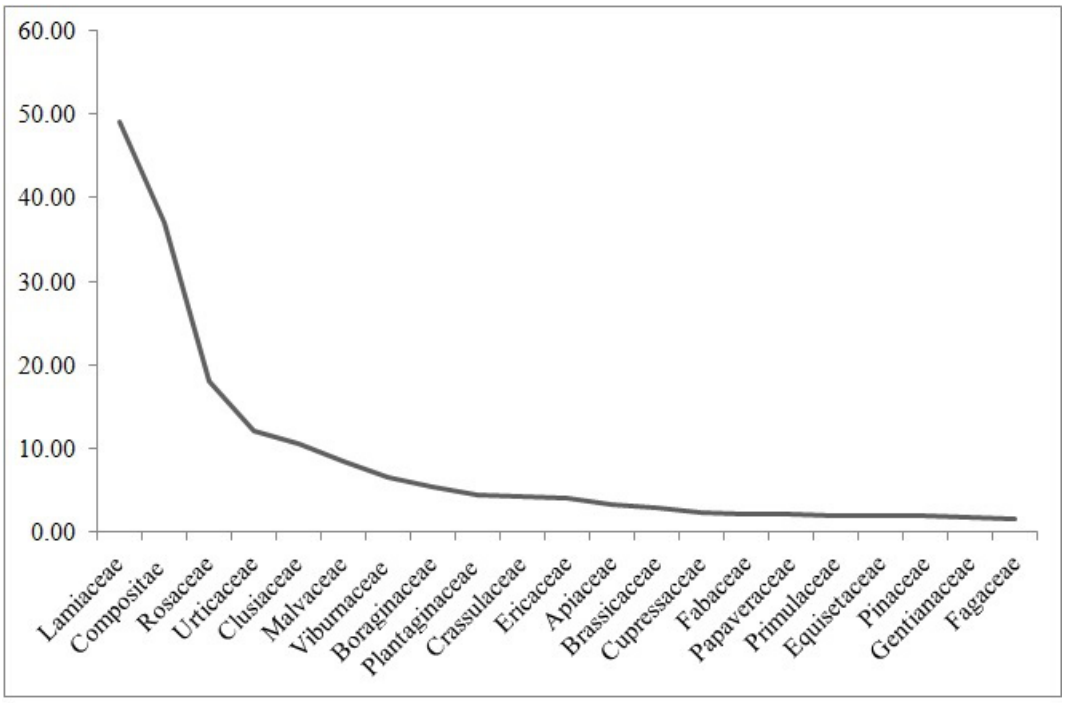

Figure 3. Family importance value (FIV) of medicinal plants used in the study area

The maximum frequency citation in this study (Electronic Supplementary Material 1) had *Urtica dioica* (FC 141), then *Thymus serpilum* (FC 125), *Achillea millefolium* (FC 112), and *Salvia offcinalis* (FC 110). The obtained FC value is ordinarily related to the widespread therapeutic uses of the plant species. Thus, the species *Achillea millefoilum had* the highest number of different therapeutic usages (16) and followed by *Matricaria chamomila* (12), *Thymus serpilum, Artemisia vulgaris and Hypericum perforatum* (11) and *Urtica dioica* (10) (Electronic Supplementary Material 1). *Salvia officinalis* was also a species with a high FC (110) but only anti-inflammatory, antipyretic and antidiabetic effects were reported.

The RFC values for the species in this work ranged from 0,002 to 0,116. *Urtica dioica* had the highest relative frequency of citation (RFC 0.116), followed by *Hypericum perforatum* (0,107), *Achillea millefoilum* (0,093), *Mentha pulegium* (0,096) and *Salvia officinalis* (0,091) (Electronic Supplementary Material 1).

Regarding the mode of preparation and plant part used, the respondents mentioned only five methods. We can notice from Fig 4. that the most often used were the leaves and above-ground parts of the plant in the form of infusion. It can also be observed that all five modes of utilization were recorded only in the cases of using above-ground parts of the whole plant or underground organs.

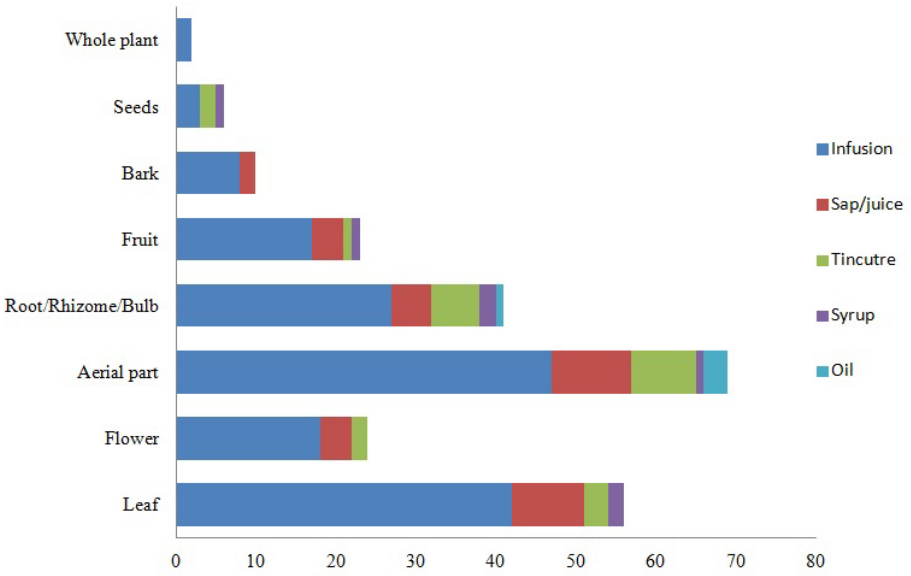

Figure 4. Comparative contributions of plant part in herbal preparations

Forgotten plants in the medical ethnobotany of BIH

This analysis included all available oldest works about ethnomedicinal practice, mainly focused on the interpretations of Middle Age manuscripts from Bosnia and Herzegovina (Bratić 1903, Bratić 1908, Dragićević 1909, Fabijanić 1975/1976, Fazlagić 1894, 1895a,b, Filipović-Fabijanić 1964, 1968, 1969/1970, 1971, Glück 1892a,b, Kulinović 1898, Medić 1904a,b, Truhelka 1889, Zovko 1890). In comparison with our results and sources about today's traditional healer's practice, with a focus on wild plants, (Ferrier et al. 2015, Ginko et al. 2023, Redžić 2007, 2010, Šarić-Kundalić et al. 2010a,b, 2011, 2015, 2016) it was evident that there is no longer in use about 21% of medicinal plants. An overview of plant species followed by their application methods, for which there are no indications of today's usage, is in Electronic Supplementary Material 2. We recorded 60 forgotten plant species from 55 genera and 40 families. All species are autochthonous and are still present today as growing wild in these areas.

Discussion

It is generally accepted that knowledge about traditional healing methods promptly decreases (Liu *et al.* 2016, Shanley & Rosa 2004, Wanjohi *et al.* 2020). Rural communities are probably the last places where this knowledge remains partially preserved (Gras *et al.* 2019, Ladio & Lozada 2009). However, in Bosnia and Herzegovina, low economic growth leads to frequent emigration and an increasing outflow of the rural population to larger urban areas or emigration. The situation is similar in neighboring Balkan countries (Pieroni *et al.* 2013, Tomasini & Theilade 2019, Zlatković *et al.* 2014). Also, the remaining rural population almost no longer employs the resource potential of wild plants, so the connection between traditional knowledge and local ecological services is eroded.

Analyzing the results of this work, we observed that the local population of Bosnia and Herzegovina, with no particular knowledge about traditional healing methods, used the resource potential of wild medicinal plants on a modest scale. Thus, we observed that 1211 respondents used only 145 medicinal species for various types of treatment. Considering the total number of approximately 5000 higher plant species in BIH (Redžić *et al.* 2008), the observed number of species was negligible. In addition, from Electronic Supplementary Material 1, we can notice that for only 14 species frequency of citation

ranged from 114 (*Urtica dioica*) to 51 (*Plantago media*). Citation frequency for 60% of species was ten or less, which is discouraging compared to the total number of respondents. The respondents used only a few simplest preparation methods as it is an infusion (Fig. 4).

More recent ethnobotanical studies from Bosnia and Herzegovina (Ferrier *et al.* 2015, Ginko *et al.* 2023, Redžić 2007, 2010, Šarić-Kundalić *et al.* 2010a,b, 2011, 2015, 2016) were, unlike our research, focused on local connoisseurs of traditional methods of treatment. The number of respondents in these studies ranged from 12 (Šarić-Kundaić *et al*. 2010b) to 150 (Rеđić 2007). The number of species listed by respondents ranged from 43 (Šarić-Kundalić *et al*. 2010a) to 254 (Šarić-Kundalić 2011). The recorded species in these works mainly enclosed those wild species from Electronic Supplementary Material 1 but also cultivated and allochthonous plants. Traditional healers furthermore mention infusion as the most common preparation method. In addition to the preparations from our study (Fig. 4), they often use decoction in water, wine, and milk. Today's herbalists sporadically use maceration (in honey), ointment, cense, powder, extract in wine, poultice, and balm. The most frequently used are leaves and aerial parts of the plant, but contrary to our research, the resin is also recorded.

BIH has a long history of multiculturalism that significantly contributed to the richness of biocultural diversity for centuries. Unfortunately, traditional knowledge about healing methods and the medicinal properties of plants is eroding. This is evidenced by a significant number of studies (Bratić 1903, Bratić 1908, Dragićević 1909, Fabijanić 1975/1976, Fazlagić 1894, 1895a,b, Filipović-Fabijanić 1964, 1968, 1969/1970, 1971, Glück 1892a,b, Kulinović 1898, Medić 1904a,b, Truhelka 1889, Zovko 1890). The authors of these studies mainly decrypt and save from decay medieval writings (local **Ljekaruše**). An exception is the works of Filipović-Fabijanić (1964, 1968, 1969/1970), Fabijanić 1975/1976) in which, additionally to recipes from medieval healers, is recorded knowledge of local herbalists from the mid-1970s.

The diachronic changes resulted in the negligence of a certain number of medicinal plants and methods of application by today's herbalists and locals. This erosion of historical usage of medicinal plants is also confirmed by different ethnobotanical studies for other regions (Bye & Linares 20/2021, Sõukand *et al*. 2022, Milani *et al.* 2023). In Bosnia and Herzegovina, there are no longer in use about 60 autochthonous plant species used in Middle Age ethnomedicine practice (Supplementary Material 2). These common species, still growing wild in this area, belong to 55 genera and 40 families.

Citations about ethnomedicine use or pharmacological activity for some of these forgotten species are scarce or non-existent. Thus, the species *Aegonychon purpurocaeruleum*, which was in the past macerated and used as poultices for the treatment of rheumatism in this area, according to Bozkurt (2021), has no pharmacological activity or ethnomedicinal application.

Likewise, there are no references about the medicinal effect of the Perennial lily (*Lolium perenne*), which, mixed with mother's milk, was once used as a poultice for infected open wounds in BIH.

For some species that are no longer in use in BiH, there were indications of their different type of usage in other regions. For example, the fresh tree sap from European white elm (*Ulmus leavi*s) in Hungary was consumed as a drink, extracted by tapping with axes or gimlets, and blowing out by elder or nettle stems (Svanber et al. 2012). But in this region, European white elm was utilized against eczema by boiling its bark in milk. The situation is similar with other species such as *Fritillaria meleagris*, *Veratrum nigrum*, *Nuphar lutea*, *Conium maculatum*, and others (Electronic Supplementary Material 2). Also, in today's ethnomedical practice, knowledge about ritual plants and traditional healing techniques has entirely vanished.

Concerning application procedures, various kinds of poultices were the most commonly used in Middle Ages period. Poultices were prepared, depending on disease type, from leaves in the form of creams, macerated fresh aerial parts or roots with added salt, boiled plant parts in the wine, and fresh plant juice. Next in the series of preparation methods were decoctions made from different plant organs cooked in water, wine, pine resin, wax, butter, and brandy. The most commonly used natural resins, together with pine and spruce, were those from *Pistacia lentiscus* and *Prunus cerasus*. They used oils from sunflower, olive, mentha, anise, juniper, chamomile, lemon peel, fennel, rosemary, sage, yew bark, almond, rose, flax, and many others, for macerations. Often prepared macerated plants were in the form of pills or drops. Those recipes also included combinations of different plant species.

Here we list the two most commonly used recipes from that period (The Strong and the Mild balm). Various types of complicated open wounds and ulcers were treated with a strong balm.

It contained the lower white bark of the *Sambucus nigra*, the root of *Achillea millefolium*, the aerial part of *Boswellia sacra*, and the resin of *Pinus sylvestris* (9 times rinsed in water) cooked, for a prolonged time, in olive oil. Then the liquid was strained and cooled until it coagulated (Bratić 1903). In the case of heavily infected - painful wounds, minimal amounts of *Helleborus odorus* root were added. A mild balm was applied to minor external injuries and prepared by making a mixture of *Urtica urens* and *Sambucus nigra* leaves, to which were added: crystal sugar, *Pinus sylvestris* resin, beeswax, tar, oil, and all melted together on fire and strained (Bratić 1908).

Conclusions

In conclusion, the decrease in knowledge about the use of medicinal plants in Bosnia and Herzegovina is evident. It includes current practitioners of traditional healing methods but also local people who do not directly deal with it. Globalization has led to the frequent use of commonly known nonnative medicinal plants. These plants are increasingly grown for personal use or resale. On the other hand, significant native plant resource funds remain forgotten, as well as the methods of application.

Declarations

Ethics approval and consent to participate: The present research received formal approval from the Ethics Committee of the Faculty of Sciences University of Sarajevo (01/01-1519/3-2023) according to the Code of Ethics of the University of Sarajevo (2012/2021, article 17). The informants were acquainted in detail with all aspects of the research and agreed to give prior consent to participate. The study design followed the Code of Ethics of the University of Sarajevo (2012/2021, article 17) and the ISE Code of Ethics (ISE 2006).

Consent for publication: Not applicable

Availability of data and materials: The data supporting this study's findings are available from the corresponding author (E.M.) upon reasonable request.

Competing interests: The authors declare no conflict of interest.

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Author contributions: Conceptualization E.M.; methodology E.M., A.P.; validation E.M., A.P.; investigation E.M., A.P.; resources E.M., A.P.; writing- original draft preparation, review and editing E.M., A.P.; Both authors have read and agreed to the published version of the manuscript.

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Supplementary Table 1. An overview of plant species with used today by people in Bosnia and Herzegovina

Scientific Name	Family	Vernacular name	Part(s) of utilization	FC	RFC	Therapeutic uses	Mode of utilization	Dosage
Achillea millefolium L.	Compositae	**hajdučka trava, kunica, sporiš**	aerial part	112	0,092	analeptic, antianemic, arteriosclerosis, antihemorrhagic, anti-inflammatory, antipruritic, antipyretic, aperitif, asthma, cardiotonic, hypertension, diuretic, dysmenorrhea, gastritis, hepatics, rheumatism	infusion with honey	during the day replacements for water
Adiantum capillus-veneris L.	Pteridaceae	**vilina vlas, gospina kosa, venerina kosa**	aerial part	3	0,002	anti-inflammatory, diuretic	juice	2 glasses daily
Agrimonia eupatoria L.	Rosaceae	**petrovac, turica, turika,**	aerial part	2	0,002	anti-haemorrhagic, anti-inflammatory, diarrhea, hepatics, rheumatism	infusion	3 cups daily, rinsing as needed
Alchemilla vulgaris	Rosaceae	**vrkuta, gospin plašt, plahtica**	aerial part	15	0,012	anti-hemorrhagic, anti-inflammatory, antiseptic, dysmenorrhea, hormonal disorders	infusion	4 cups daily
Allium ursinum L.	Amaryllidaceae	**medvjeđi luk, srijemuš,**	leaf, bulb	13	0,011	antianemic, anti-inflammatory, aperitif, dermatitis, dyspepsia, gastritis, hypertension, osteoporosis	tincture, infusion, milk	10-15 drops with a little of water, 4 cups of infusion daily
Althaea officinalis L.	Malvaceae	**bijeli šljez, sljezovina**	root, leaf, flower	33	0,027	antitussive, diarrhea, gastritis	infusion, honey	3 cups daily, 2 tablespoons in the morning and in the evening
Anacamptis morio (L.) R. M. Bateman, Pridgeon & M. W. Chase	Orchidaceae	**kaćun, salep, pasja jaja**	tuber	18	0,015	anti-inflammatory	syrup	1 tablespoon 3x a day
Anemone nemorosa L.	Ranunculaceae	**breberina, šumarica**	aerial part	3	0,002	skin disease		
Angelica archangelica L.	Apiaceae	**anđelika**	aerial part	2	0,002	analeptic, asthma, flatulence, migraine	infusion	1 cup daily
Anthyllis vulneraria L.	Fabaceae	**ranjenik**	aerial part	4	0,003	contusion, cough, skin disorders, wound	infusion	
Arbutus unedo L.	Ericaceae	**planika**	leaf, fruit	10	0,008	constipation, skin diseases, urinary disorder	decoction, fresh fruit	

Arctium lappa L.	Compositae	**čičak, repuh**	root, leaf, fruit	18	0,015	antipruritic, aperitif, arteriosclerosis, diabetes, diuretic, eczema, hepatic, hyperglycemia, psoriasis	infusion	3 cups daily
Arctostaphylos uva-ursi (L.) Spreng.	Ericaceae	**uva**	leaf	7	0,006	antiinfective, arthritis, diuretic	infusion	4 cups daily for 7 days
Arnica montana L.	Compositae	**brđanka, vučji zub, veprovac**	aerial part, flowers	5	0,004	alopecia, chronic venous insufficiency, osteoarthritis, rheumatism	infusion	3 cups daily
Artemisia absinthium L.	Compositae	**pelin, pelim**	aerial part	23	0,019	antiemetic, antipyretic, diuretic, dyspepsia, gastritis, hepatic, laxative.	infusion, tincture	2 cups of infusion daily, tincture massaging as needed
Artemisia vulgaris L.	Compositae	**divlji pelin, komonjika, komunika, crnobilj, crni pelin, umit**	young shoots	21	0,017	antianemic, antipyretic, antispasmodic, aperitif, diabetes, diarrhea, diuretic, gastritis, hepatic, laxative, rheumatism	infusion, tincture	1 cup of infusion daily, 20 drops in a glass of water
Asparagus officinalis L.	Asparagaceae	**viline metle, šparoga**	young shoots	7	0,006	prostate inflammation, urinary infection	infusion	1 cup daily
Asplenium ceterach L.	Aspleniacae	**zlatna paprat**	leaf	7	0,006	cough, skin diseases, urinary infections	infusion	1 cup daily
Asplenium scolopendrium L.	Aspleniacae	**jelenski jezik**	leaf	10	0,008	dysentery, lung diseases, snakebite	infusion, with vine	2 cups daily
Bellis perennis L.	Compositae	**tratinčica, krasuljak, drnica, klobučak**	leaf, flower	3	0,002	antipyretic, antispasmodic, gastritis, rheumatism	infusion, ointment	2 cups daily, massage as needed
Berberis vulgaris L.	Berberidacae	**žutika, babnja, breberika**	root, flower, bark	2	0,002	antiemetic, arteriosclerosis, diuretic, hypertension, rheumatism	infusion	2 cups daily after meals
Betula pendula Roth	Betulaceae	**breza**	leaf, bark, fresh sap	16	0,013	antiinfective, diarrhea, dermatitis, diuretic, hepatic, hypertension.	infusion, juice	3 cups of infusion daily, a cup of juice daily
Capsella bursa-pastoris (L.) Medik.	Brassicaceae	**rusomača, pastirska torbica**	aerial part	33	0,027	anti-haemorrhagic, arteriosclerosis, diuretic, dysmenorrhea, dyspepsia, gastritis, hepatics.	infusion	3 cups daily

Carlina acaulis L.	Compositae	**kravljak, sikavac**	root	7	0,006	urinary infection, hypertension, hepatitis, antiseptic for skin diseases.	infusion, fresh juice, infusion in vinegar	1-2 cups daily, for skin diseases directly to the skin
Centaurea benedicta (L.) L.	Compositae	**blaženi čkalj**	leaf	6	0,005	cancer of stomach, strengthen of liver and spleen.	infusion, tincture	3 cups of infusion daily, tincture up to 10 mL daily
Centaurium erythraea Rafn	Gentianaceae	**kićica, gorka trava, crveni kantarion**	aerial part, root	2	0,002	antianemia, anorexia, dyspepsia, gastritis, laxative, antipyretic.	infusion, tincture, powder, juice	cup of infusion daily, 1-2 ml in water daily
Centaurium maritimum (L.) R. M. Fritsch	Gentianaceae	**kantarija, kitica**	aerial part	10	0,008	genital disorder, leucorrhea, stomach disorders.	infusion, tincture	2 cups daily
Ceratonia siliqua L.	Fabaceae	**rogač, rožićak, kaluber**	fruit	2	0,002	sore throat, dysmenorrhea, gastritis, diarrhea	infusion	2 cups daily
Chelidonium majus L.	Papaveraceae	**rosopas, zarastovača, zmijino mlijeko**	aerial part	26	0,021	dermatitis, rheumatism.	juice from the stem	soak or massage as needed
Cichorium intybus L.	Compositae	**cikorija, konjogriz, vodopija, ženetrga**	aerial part, root	35	0,029	antianemic, aperitif, diabetes, diarrhea, diuretic, hepatics, gastritis, laxative.	infusion	3 cups daily
Cornus mas L.	Cornaceae	**drijenak, drijen, drijenjina**	fruit, sap from a tree	7	0,006	antipyretic, diabetes, diarrhea, respiratory disease, vitamin C deficiensis.	juice, infusion	2 glasses of juice daily, 3 cups of infusion daily
*Cotinus coggygria*Scop.	Anacardiaceae	**ruj**	leaf	5	0,004	fever, hair regeneration, skin diseases.	infusion	2 cups daily
Crataegus monogyna Jacq.	Rosaceae	**glog, bijeli glog**	leaf, flower, fruit	76	0,063	arteriosclerosis, cardiotonic, hypertension.	infusion	1 cup daily
Cynoglossum officinale L.	Boraginaceae	**mišinac, mali gavez**	aerial part, root	7	0,006	bone fracture external, burn, skin disorders.	maceration, decoction in milk	directly to the skin
Dictamnus albus L.	Rutaceae	**jasenak**	aerial part, root	2	0,002	cough, sedative, stomach disorder.	infusion	1 cup daily
Elytrigia repens (L.) Nevski	Poaceae	**pirevina**	rhizome	1	0,001	antiinfective.	syrup	3 small cups daily
Epilobium parviflorum Schreb.	Onagraceae	**vrbovica**	aerial part	6	0,005	antiinfective, diuretic, hypertrophy.	infusion	3 cups daily

Equisetum arvense L.	Equisetaceae	**livadska preslica, preslica,**	aerial part	24	0,020	anti-anemic, antiinfective, diabetes, diuretic, rheumatism.	infusion	1 liter daily
Eryngium amethystinum L.	Apiaceae	**kotrljan**	root	10	0,008	hepatitis, diuretic.	infusion	1 cup daily
Fagus sylvatica L.	Fagaceae	**bukva**	leaf	2	0,002	antiinflammatory	infusion	1-2 cups if needed
Ficus carica L.	Moraceae	**smokva**	leaf	3	0,002	diabetes	infusion	1 cup daily
Filipendula vulgaris Moench	Rosaceae	**kraljica polja**	aerial part	3	0,002	circulation, cough, fever, rheumatism.	infusion, fresh juice	3 times a day
Foeniculum vulgare Mill.	Apiacaeae	**komorač**	aerial part	21	0,017	antianemic, anti-inflammatory, antipyretic, diarrhea, hypertension.	infusion, syrup	2 cups of infusion daily, 0.5 dl of syrup daily
Fragaria vesca L.	Rosaceae	**šumska jagoda**	leaf, rhizome, fruit	20	0,017	anti-anemic, antitussive, arteriosclerosis, dyspepsia, gastritis, hypertension, vitamin C deficiensis.	infusion	3 cups daily
Fraxinus ornus L.	Oleaceae	**crni jasen**	leaf	5	0,004	constipation, cough, fever.	infusion, fresh fruit	1 teaspoonful up to 1 or 2 daily
Galium verum L.	Rubiaceae	**bročika, ivanjsko cvijeće, rutavica, sirište, slipavka**	aerial part	7	0,006	anti-inflammatory, laxative, gastritis, diuretic, hepatic, antiinfective.	infusion	3 cups daily
Gentiana lutea L.	Gentianaceae	**lincura, srčanik, siništara, žuti encijan,**	root, aerial part	11	0,009	antianemic, aperitif, arteriosclerosis, cardiotonic, diabetes, diarrhea, dyspepsia, gastritis, hypertension.	infusion, tincture	cup of infusion daily, 10-20 drops of tincture per cup of infusion
Geranium macrorrhizum L.	Geraniaceae	**zdravac planinski**	rhizome	3	0,002	menstruation disorders, stomach disorder.	infusion, decoction	1 cup daily
Glechoma hederacea L.	Lamiaceae	**dobričica**	aerial part	9	0,007	asthma, gastritis.	infusion	3 cups daily
Glycyrrhiza glabra L.	Fabaceae	**sladić**	root	7	0,006	hepatitis, hysteria, stomach disorders, sore throat, stone and sand in the kidney.	infusion, extract in oil olive	
Hedera helix L.	Araliaceae	**bršljan**	leaf	14	0,012	anti-emetic, anti-inflammatory, diuretic, hypertension, rheumatism.	infusion	3 cups daily
*Helichrysum italicum (*Roth) G. Don	Compositae	**smilje**	flower	13	0,011	antianemic, antipyretic, migraine.	infusion	2 cups daily

Heracleum sphondylium L.	Apiaceae	**medvjeđa šapa, dežen, paponjak, vučja peta**	young leaf, stem, root	2	0,002	diarrhea	infusion	2-3 cups daily
Herniaria hirsuta L.	Caryophyllaceae	**kilavica, sitnica,**	aerial part	10	0,008	antiinflammatory	infusion	2.5 dl daily
Hypericum perforatum L.	Clusiaceae	**kantarion, bogorodičina trava, ivanova trava**	aerial part	129	0,107	analeptic, antianemic, antiinfective, antifungal, asthma, diarrhea, dysmenorrhea, gastritis, hepatic, migraine, rheumatism.	infusion, oil	2 cups daily, massages 2 times a day
Hyssopus officinalis L.	Lamiaceae	**miloduh, isop**	aerial part	12	0,010	inflammation of spleen, kidney inflammation, lung diseases, neurosis, skin disease, stomach, venereal diseases.	infusion, oil	
Inula helenium L.	Compositae	**oman, veliki oman, bijeli oman**	root	2	0,002	antiinfective, respiratory diseases.	infusion	1 cup daily
Juglans regia L.	Juglandaceae	**orah**	leaf, immature fruits	18	0,015	dermatitis, diabetes, gastritis,hypo-hyperthyroidism, rheumatism.	infusion, syrup, honey	2 cups of infusion daily, 0.5 dl of syrup daily, 1 tablespoon of honey daily
Juniperus communis L.	Cupressaceae	**kleka, smreka**	galbulus, yang shots	24	0,020	antianemic, antiinfective, anti-inflammatory, diabetes, dyspepsia, gastritis, hepatics, laxative, rheumatism, scurvy.	infusion, juice, tincture	4 cups of infusion daily, 1 cup of juice daily, 0.5dl of tincture with a glass of water daily
*Juniperus oxycedrus*L.	Cupressaceae	**crvena kleka**	galbulus	5	0,004	leucorrhea, liver and skin disease, strengthen of muscles, throat inflammation, for better breast, strengthen of male sex organs	infusion, syrup	few cups daily
Lamium galeobdolon (L.) Crantz	Lamiaceae	**žuta mrtva kopriva**	leaf, flower	2	0,002	antiinfective, diuretic.	infusion	2 cups daily if needed
Laurus nobilis L.	Lauraceae	**lovor**	leaf, fruit	3	0,002	antitussive, flatulence, gastritis.	infusion	2 cups daily
Lavandula angustifolia Mill. subsp. *angustifolia*	Lamiaceae	**despik, lavanda**	aerial part	22	0,018	analeptic, cardiotonic, gastritis, hypertension, migraine, rheumatism	infusion, oil	1 cup of infusion daily, massages in

								the head area as needed
Lysimachia nummularia L.	Primulaceae	**metilj, trava zmijac**	aerial part	2	0,002	skin diseases, diarrhea, regulation of menstrual cycle	infusion	1 cup daily
Malva sylvestris L.	Malvaceae	**crni sljez, sljezovača, gusja trava, divlji papel**	whole plant	15	0,012	anti-anemic, anti-inflammatory, antitussive, gastritis.	infusion	2 cups daily
Marrubium vulgare L.	Lamiaceae	**obična marulja, očajnica, smrduša**	aerial part	8	0,007	antiseptic	infusion	1 cup daily, 3-4 weeks
Matricaria chamomilla L.	Compositae	**kamilica**	leaf, flower	71	0,059	antianemic, anti-inflammatory, antipyretic, arthritis, antispasmodic, dermatitis, diarrhea, diuretic, flatulence, gastritis, hypertension, migraine.	infusion	4 cups daily
Melilotus officinalis (L.) Lam.	Fabaceae	**kokotac**	leaf	2	0,002	glands inflammation	infusion	2 cups daily
Melissa officinalis L.	Lamiaceae	**melisa, matičnjak, pčelinja ljubica, limunčić**	aerial part	35	0,029	analeptic, antiviral, asthma, cardiotonic, dyspepsia, gastritis, hypertension, laxative.	infusion	1 cup daily
Melittis melissophyllum L.	Lamiaceae	**medenika,medunika**	aerial part	5	0,004	respiratory diseases	infusion	2-3 cups daily
Mentha pulegium L.	Lamiaceae	**verem trava**	aerial part	116	0,096	analeptic, anti-inflammatory, gastritis.	infusion	1 cup daily
Nepeta cataria L.	Lamiaceae	**mačija metvica**	aerial part	30	0,025	analeptic, aseptic, dysmenorrhea.	infusion	3 cups daily
Nigella damascena L.	Ranunculaceae	**čurokot, mačkov brk**	seed	12	0,010	analeptic, hepatic.	infusion	3 cups daily
Ononis spinosa L.	Fabaceae	**zečiji trn, gladuška, gladiš, grebenka**	root	6	0,005	diuretic, dyspepsia, hepatics, rheumatism, respiratory diseases.	infusion	5 cups during 24h
Origanum vulgare L.	Lamiaceae	**divlji origano, mravinac, vranilova trava**	aerial part	16	0,013	analeptic, antipyretic, dyspepsia, gastritis, hepatic.	infusion	2 cups daily
Oxalys acetosella (L.) Scop.	Oxalidaceae	**kisela djetelina, zečija soca, slanica**	leaf, lower	1	0,001	Parkinson's disease	infusion	2 cups daily
Paeonia officinalis L.	Paeoniaceae	**božur**	root, seeds	4	0,003	antipyretic and antispasmodic.	powder, in boiled wine	three times daily

Paliurus spina-christi Mill.	Rhamnaceae	**drača**	fruit	2	0,002	cough, improvement potency, stomach and liver disorders.	infusion, tincture in lozovaca	1 cup daily
Parietaria officinalis L.	Urticaceae	**crkvina trava**	aerial part	7	0,006	skin diseases	infusion	directly to the skin
Petasites hybridus (L.) G. Gaertn. & al.	Compositae	**lopuh, veliki čičak, repuh**	root, leaf	4	0,003	rheumatism	infusion	3 cups daily
Picea abies (L.) H. Karst.	Pinaceae	**smreka, smrča**	needles, cones, buds	6	0,005	anti-inflammatory, antibacterial, antiseptic, asthma, cough, cuts and other external skin conditions, headaches, liver affections, migraines, rheumatic pain	syrup, ointment	syrup from fresh cones and buds against cough, resin-based ointments for healing cuts and other external skin conditions, infusion from young branches for liver disorders, bud syrup for the treatment of rheumatic pains, headaches and migraines
Pilosella officinarum Vaill.	Compositae	**runjika, zečija loboda**	aerial part, root	7	0,006	kidney, prostate inflammation, urinary system.	infusion	1 cup three times daily
Pimpinella saxifraga L.	Apiaceae	**bedrenika, dinjica**	root	6	0,005	diarrhea, recovery, strengthen of stomach, skin disorders.	powder, decoction	1 cup daily, directly to the skin
Pinus nigra J. F. Arnold	Pinaceae	**bor**	needles	18	0,015	asthma	syrup, honey	1-2 tablespoons of honey or syrup a day
Plantago media L.	Plantaginaceae	**trputac,srednja bokvica**	leaf	51	0,042	antianemic, anti-hemorrhagic, anti-inflammatory, antipyretic, diarrhea, gastritis, hepatics, rheumatism.	infusion	2 cups in the morning

Polygonatum odoratum (Mill.) Druce	Asparagaceae	**pokosnica**	rhizome	5	0,004	blooding from trachea, cough, hemorrhoids, leucorrhea, liver disorders, uterus disorders, wound.	fresh juice, infusion	up to 3 cups daily
Polygonum aviculare L.	Polygonaceae	**troskot**	leaf	13	0,011	antiinfective, migraine, rheumatism, tuberculosis.	infusion	4 cups daily
Polypodium vulgare L.	Polypodiaceae	**slatka paprat**	rhizome	5	0,004	spleen diseases	infusion	0.5l daily
Potentilla erecta (L.) Räusch.	Rosaceae	**srčenjak, trava od srca, stežnik**	rhizome	4	0,003	anti-inflammatory, diarrhea.	infusion	2 cups daily
Potentilla reptans L.	Rosaceae	**petoprsta, puzajući petolist, petoprsnica**	root	2	0,002	antispasmodic, diarrhea.	infusion	3 cups daily
Primula acaulis (L.) L.	Primulaceae	**jagorčevina**	aerial part	16	0,013	analeptic, antipyretic, arthritis, cardiotonic, diuretic.	infusion	3 cups daily
Primula veris L.	Primulaceae	**jaglac, jaglika**	aerial part	7	0,006	analeptic, migraine, rheumatism.	infusion	3 cups daily
Prunella laciniata(L.) L.	Lamiaceae	**bijela celinčica**	aerial part	4	0,003	asthma, diarrhea, liver, strengthen of heart	decoction, infusion	
Prunus avium (L.) L.	Rosaceae	**trešnja**	petioles, fruit	4	0,003	anti-inflammatory, arteriosclerosis	infusion	2 cups daily
Prunus spinosa L.	Rosaceae	**trnina, crni trn, kukinja**	fruit	6	0,005	antianemic, antitussive, diabetes, gastritis, vitamin C deficiencies, laxative	infusion	1 cup daily
Pulmonaria officinalis L.	Boraginaceae	**plućnjak, lisac, medunika**	leaf, flower	4	0,003	anti-inflammatory, diuretic	infusion	3 cups daily
Punica granatum L.	Lythraceae	**nar**	bark, fruit	5	0,004	diarrhea	infusion	2 cups daily
Quercus pubescens Willd.	Fagaceae	**hrast medunac**	bark, fruit	7	0,006	diarrhea, stomach warm	decoction, infusion	3 cups daily
Quercus robur L.	Fagaceae	**hrast lužnjak**	bark, leaf, fruit	11	0,009	antipyretic, antitussive, diarrhea, dyspepsia	infusion	2 cups daily
Rhamnus cathartica L.	Rhamnaceae	**pasdrijen**	bark	6	0,005	fistulae and hemorrhoids, recovery, skin disease, tonsillitis, vaginal chronic infections	decoction, maceration, powder	
Rhus coriaria L.	Anacardiaceae	**ruj, jelenov rog**	leaf, heartwood, juice	8	0,007	analgetic, urinari infections	powder, infusion, juice	3 cups daily
Rosa canina L.	Rosaceae	**šipurak, divlja ruža**	leaf, fruit, flower	59	0,049	antianemic, antihemorgic, anti-infective, antipyretic, diarrhea,	infusion	4 cups daily

						diuretic, endocrine diseases, gastritis		
Rosmarinus officinalis L.	Lamiaceae	**ruzmarin, zimrad**	leaf	11	0,009	analeptic, cardiotonic, gastritis, hepatics, rheumatism	infusion	1 cup daily
Rubus idaeus L.	Rosaceae	**malina**	leaf	8	0,007	antiinfective, gastritis	infusion	replacements for water during the day
Rubus plicatus Weihe & Nees	Rosaceae	**kupina, ostruga**	leaf	8	0,007	antianemic, diarrhea, gastritis, hypertension	infusion	3 cups daily
Ruta graveolens L.	Rutaceae	**ruta**	aerial part	14	0,012	cardiotonic, laxative, rheumatism	infusion	2 cups daily
Salix alba L.	Salicaceae	**bijela vrba**	bark	7	0,006	rheumatism	infusion	2-3 cups in the evening
Salvia officinalis L.	Lamiaceae	**kadulja, žalfija**	aerial part	110	0,091	anti-inflammatory, antipyretic, diabetes	infusion	rinsing as needed or a small cup of infusion daily
Sambucus ebulus L.	Viburnaceae	**aptovina, apt, burjan**	leaf, root, fruit	6	0,005	antipruritic	juice	1 tablespoon daily
Sambucus nigra L.	Viburnaceae	**zova, bazga, crna zova, bazdovina**	leaf, flower	75	0,062	antidiabetic, anti-inflammatory, antipyretic, aperitif, diuretic, dyspepsia, gastritis, rheumatism	infusion, juice	3 cups of infusion daily, 2 cups of juice daily
Sanguisorba minor Scop.	Rosaceae	**dinjica, krvara, zmijina trava**	fresh leaf	9	0,007	diabetes, melting of kidney stone, skin disorders, snakebite	fresh juice, infusion	2 cups daily, directly to the skin
Satureja montana L.	Lamiaceae	**vrisak bijeli**	aerial part	15	0,012	gastritis	infusion	2 cups if needed
Sedum acre L.	Crassulaceae	**žuti žednjak**	aerial part	11	0,009	liver regeneration, skin warts	fresh juice	few cups daily
Sedum telephium L.	Crassulaceae	**bobovac**	aerial part	1	0,001	epilepsy, antipyretic	fresh juice	2-3 cups daily
Sempervivum tectorum L.	Crassulaceae	**čuvarkuća, pazikuća**	leaf	41	0,034	antipyretic, dermatitis, diabetes, earache, gastritis	leaf juice, honey	2 drops in the ear, 1 tablespoon of honey in the morning before breakfast
Silene vulgaris (Moench) Garcke	Caryophyllaceae	**pucavac, puca, napuhnuta pušina,**	leaf	2	0,002	antiinflammatory	infusion	3 cups daily

		skripac, sivičić, bublica						
Silybum marianum (L.) Gaertn.	Compositae	**sikavica, osljebad, badelj, šareni čkalj, bijeli stričak, magareća**	seed	4	0,003	hepaticss	infusion	2 cups if needed
Sinapis arvensis L.	Brassicaceae	**gorušica, hardala**	seed	3	0,002	asthma	with honey	1 tablespoon daily
Solidago virgaurea L.	Compositae	**zlatnica, krikica**	aerial part	3	0,002	diuretic	infusion	1 l drink within 1-2 days
Sorbus torminalis (L.) Crantz	Rosaceae	**brekinja, divlja oskoruša, bukovnica**	bark	2	0,002	diabetes, diarrhea	infusion, decoction	a cup of infusion if needed
Stachys officinalis (L.) Trevis.	Lamiaceae	**ranjak, betunika, čistac**	aerial part	9	0,007	headache, antiseptic, spasms	juice, macerat	
Succisa pratensis Moench	Dipsacaceae	**piskavica**	aerial part	6	0,005	dissolves blood, skin diseases	in vine	
Symphytum officinale L.	Boraginaceae	**gavez, crni korijen**	leaf, root	55	0,045	asthma,arteriosclerosis, arthritis, diuretic, rheumatism	infusion, cream	2 cups of infusion daily, massage if needed with a smaller amount
Syringa vulgaris L.	Oleaceae	**jorgovan**	bark, flower	3	0,002	aerophagia, antipyretic	infusion	1 cup daily
Tanacetum balsamita L.	Compositae	**kaloper**	leaf	9	0,007	analgetic, anti-inflammatory, anti-parasitic	infusion, powder	1 cup daily
Taraxacum F. H. Wigg. sect. *Taraxacum*	Compositae	**maslačak, žućanik**	root, leaf, flower	73	0,060	antianemic, antispasmodic, diabetes, eczema, hemorrhoids, hepatic, hepatitis, laxative, rheumatism	infusion, honey	1 cup of infusion daily, 2 tablespoons of honey daily
Teucrium chamaedrys L.	Lamiaceae	**dupčac, stupčac, mravak, suhovrh**	aerial part	3	0,002	antibacterial, diabetes, diarrhea, gastritis	infusion	3 cups daily
Teucrium montanum L.	Lamiaceae	**iva trava**	aerial part	36	0,030	antifungal, antitussive, dyspepsia, hepatic	infusion	3 cups daily
*Thymus pulegioides*L.	Lamiaceae	**timijan, majkina dušica**	aerial part	23	0,019	cough, neurosis, stomach disease	infusion, powder	up to 3 cups daily
Thymus serpyllum L.	Lamiaceae	**majčina dušica, čubar**	aerial part	125	0,103	analeptic, antianemic, antiinfective, antipyretic, asthma, diuretic, dysmenorrhea,	infusion	4 cups daily

						gastritis, hepatic, hypertension, laxative		
Tilia cordata Mill.	Malvaceae	**sitnolisna lipa**	flower	54	0,045	analeptic, antianemic, anti-inflammatory, antipyretic, aseptic, diuretic, dyspepsia, hypertension, rheumatism	infusion	1 cup daily
Trifolium pratense L.	Fabaceae	**crvena djetelina**	flower, seed	5	0,004	anti-inflammatory, hypo-hyper thyroidism	infusion, in vine	2 cups daily, not longer than 15 days
Tussilago farfara L.	Compositae	**podbjel**	leaf, flower	33	0,027	antipyretic, antispasmodic, asthma, tuberculosis	infusion	3 cups daily
Urtica dioica L.	Urticaceae	**žara, kopriva**	whole plant	141	0,116	analgesic, antianemic, antipyretic, arteriosclerosis, dermatitis, diabetes, diuretic, dysmenorrhea, hepatics, rheumatism	infusion	3 cups daily, directly to the skin
Vaccinium myrtillus L.	Ericaceae	**borovnica, vrisinje**	leaf, fruit	20	0,017	antianemic, anti-inflammatory, arteriosclerosis, diabetes, diarrhea, dyspepsia, gastritis, vitamin C and E deficiencies	infusion, juice	2 cups of infusion daily, 1 cup of juice daily
Vaccinium vitis-idaea L.	Ericaceae	**brusnica**	leaf, fruit	13	0,011	antiinfective, diuretic, rheumatism	infusion	1.5l during the day
Valeriana officinalis L.	Valerianaceae	**valerijana**	rooth	8	0,007	analeptic, hypertension, migraine	infusion	2 cups daily
Verbascum thapsus L.	Scrophulariaceae	**divizma, vučiji rep**	leaf, flower	7	0,006	rheumatism, tuberculosis	tincture, infusion	0.5dl of tinctures daily, 3 cups of infusion daily
Verbena officinalis L.	Verbenaceae	**sporiš, ljutovnica, željezarka**	aerial part	12	0,010	epileptic, headache, antiseptic	powder, infusion, juice	2 cups daily
Veronica officinalis L.	Plantaginaceae	**čestoslavica, dobričica**	leaf, flower	3	0,002	antipruritic, gastritis, rheumatism	infusion	3 cups daily
Vinca major L.	Apocynaceae	**zimzelen**	shoot, fruit, root	11	0,009	cardiotonic, menstruation, urinary diseases	in wine, powder	
Viola odorata L.	Violaceae	**ljubica mirisna**	leaf, flower	14	0,012	antitussive	infusion	3 cups daily
Viscum album L.	Loranthaceae	**imela bijela**	aerial part	18	0,015	analeptic, cardiotonic, dysmenorrhea, hypertension	infusion, tincture	1 cup of infusion daily, 20 drops of tincture in a

								cup of water 2 times a day
*Vitex agnus-castus*L.	Lamiaceae	**fratarski biber, konopljika**	aerial part, seed	4	0,003	against high potency, for nervous balance, hysteria, menstrual disorders	infusion, decoction, powder	1 cup daily
Vitis vinifera L.	Vitaceae	**loza**	leaf, root	1	0,001	antipyretic, diuretic	with honey, juice	2 cups daily

Supplementary Table 2. An overview of plant species with no indications of present use in Bosnia and Herzegovina

Scientific Name	Family	vernacular name	Use description
Acer pseudoplatanus L.	Sapindaceae	gorski javor	Wound cleaning: a poultice of leaves with cream
Aconogonon alpinum (All.) Schur	Polygonaceae	planinski dvornik, alpski srčenjak	No data
Aegonychon purpurocaeruleum (L.) Holub	Boraginaceae	uložena trava, modra biserka	Rheumatism: poultices of macerated *Aegonychon.*
Ajuga reptans L.	Lamiaceae	puzava ivica	Coughs: a decoction of aerial part. Boiled in milk and take 3 times a day for 10 days.
Alnus glutinosa (L.) Gaertn.	Betulaceae	crna joha, jošika	Against fleas: burn the leaves and cense the hair. Syphilis: mix (alder tassels, mercury, carnation, oak acorns). Cooked with rye flour and prepare pills and cense on it. Dysentery: the bark boiled with milk and drink.
Alyssum alyssoides (L.) L.	Brassicaceae	čaškasta gromotulja, tirjača	Stomach-ache: eat the fresh aerial part with white wine
Anagallis arvensis L.	Primulaceae	mišjakinja, vidovčica	Sore throat, toothache: poultice of leaves. Weakness (dropsy associated with physical weakness): boil juniper cone berry with *Anagalis* in wine and drink. Kidney stones: a decoction of ash bark and *Solidago virgoa-aurea* with *Anagalis* drink for three days.
Aristolochia clematitis L.	Aristolochiaceae	žuta vučja stopa	Inducing birth: powdered seeds on a boiled egg. In larger amounts to induce abortion
Aristolochia rotunda L.	Aristolochiaceae	lukovac trava, okruglolisna vučja stopa	Kidney stones: the dried aerial part mix with water and drink three times a day. Tissue healing: poultices of fresh plant
Arum maculatum L.	Araceae	kozlac, pjegasti (obični) kozlac	Diphtheria: grind the root with salt and put poultice on swelling neck. Open wounds that are infected: poultices on the first day (apply only *Arum*) and boiled *Arum* in milk on the second day. It is also an ingredient of a strong balm.
Atriplex oblongifolia Waldst. & Kit.	Chenopodiaceae	loboda, dugolisna pepeljuga	No data
Atropa bella-donna L.	Solanaceae	devesilje, beladona	Wound healing: apply balm made from: fry Thyme, Basil and Belladonna, then ground mixture into powder and cook in cow's butter. Colic: mix pork fat, plum jam, and belladonna extract and make an ointment to massage the abdomen. Against ticks: poultice of mix belladona root and leaf grind with salt.
Brassica rapa (L.) L.	Brassicaceae	repa, bijela repa	No data
Bryonia alba L.	Cucurbitaceae	tikvina debela, tušica	Snake bites: poultices from fresh aerial part or slices of fresh root. Maturation of ulcers: poultice of root powder boiled in wine. Dropsy: poultices of fresh salted root slices on the stomach. Detox, kidney stone, anthrax: drink the root juice. Tuberculosis: tea of *Bryonia* and *Smyrnium perfoliatum*.
Bryonia dioica Jacq.	Cucurbitaceae	tikva divlja	Earache: ear drops (the aerial part of the plant soaks in three-year-old vinegar).

Conium maculatum L.	Apiaceae Lindl.	aftovina, kukuta	Lumbago: dig a pit the size of a man, burn the soil in it, put a lot of *Conium maculatum* and *Alium ursinum* in the hot hole and lay the patient on it.
Cyclamen purpurascens Mill.	Primulaceae	križalina, klobučac	Headache, neck pain: the juice of the plant as a poultice
Dipsacus fullonum L.	Dipsacaceae	češljugovina	Dysentery: decoction of the plant. Internal and external bleeding: the juice of the plant. Bladder stones: eat fried whole plant with juniper cone berry.
Euphorbia lathyris L.	Euphorbiaceae	mliječar za groznicu, avdisalatin,	Detox: drink 6-12 seeds together with water. Constipation: oil. Teeth whitening and caries: gargle boiled the aerial part in wine (rinse the mouth afterward). Respiratory infections: squeeze out the juice and smear the nostrils.
Ficaria verna Huds.	Ranunculaceae	trava zlata, ledinjal	Internal diseases: a syrup balm made of cooked *Ficaria, Teucrium chamedris* and *Mellisa officinalis.*Drink 40 days on an empty stomach.
Fraxinus excelsior L.	Oleaceae	obični jasen,bijeli jasen	Eczema: poultices made from tree sap. Wound healing, eczema: poultices from the inside of the bark. Eczema: wood ash mixed with honey. Spleen (spleen pain): a decoction of bark in wine. Hepatitis: decoction of mixed: ash bark, blackthorn, bugle in white wine. Drink in the morning.
Fritillaria meleagris L.	Liliaceae	trava od košutice, kockavica	Lactation: eat the young bulbs on an empty stomach for 40 days
Galanthus nivalis L.	Amaryllidaceae	visibaba	No data
Heliotropium europaeum L.	Boraginaceae	lišajeva trava, bradavka	Eczema in children: poultice of fresh juice.
Helleborus odorus Willd.	Ranunculaceae	kukurjek	Infected, open wounds, gangrene: poultices of fresh leaves.
Hylotelephium maximum (L.) Holub	Crassulaceae	bobovnik, žednjak, ledenik žuti	Cough: syrup balm made of cow's butter washed in 10 water, juice of the stem of *Hylotelephium,*sugar. Eat half a spoon every morning and evening.
Hyoscyamus niger L.	Solanaceae	crna bunika, zubna trava	Caries: apply powder from the dried root on the tooth. Bones pain: a poultice of the tree with leaves. Eye ulcer: cense with seeds
Juncus conglomeratus L.	Juncaceae	sit sivozeleni	Bladder stones, diuretic: a decoction of the whole plant with walnuts. Drink for 40 days.
Juniperus sabina L.	Cupressaceae	somina, smrdljika	Asthma: juniper cone berry and leaves dry and smoke like tobacco. It can also be drunk as tea. Skin diseases: fried and apply as a balm
Leontopodium nivale subsp. *alpinum* (Cass.) Greuter	Compositae	runolist, ravet	Tuberculosis: herbal brandy made of the soaked root of *Leontopodium* and *Artemisia vulgaris* aerial part in lozovača (grape brandy). Drink one glass on an empty stomach.
Lolium perenne L.	Poaceae	ljulj, vrat	Infected, open wounds: poultice of mixed *Lolium* powder with breast milk. Gangrene: powder of the whole plant and sprinkled on the wound.
Lotus corniculatus L.	Fabaceae	pšeničica, švinđuša	No data
Mercurialis perennis L.	Euphorbiaceae	srčanik, resulja	Constipation: macerate the raw root and mixed with water or honey and drink.

Narcissus pseudonarcissus L.	Amaryllidaceae	zelenkada, narcis	Mastitis: poultice of macerated fresh leaves with honey. Burns, rheumatism: poultice of fresh root.
Nasturtium officinale W. T. Aiton	Brassicaceae	bobovnjak, ren	Stuttering: hold the root under the tongue.
Nuphar lutea (L.) Sm.	Nymphaeaceae	žuti lokvanj	No data
Nymphaea alba L.	Nymphaeaceae	lepuh veliki	Madness: syrup balm made of Dandelion root, Common agrimony root and leaf, root of *Nymphea.* Dry and macerate mixture with a beaten egg and drink it.
Ostrya carpinifolia Scop.	Corylaceae	crni grab	No data
Oxalis acetosella L.	Oxalidaceae	kupus zečiji	Antipyretic: poultices of the macerated aerial part of plant on the soles
Physalis alkekengi L.	Solanaceae	pogančeva trava	Syphilis: cense with aerial part of the plant. The poultice of the aerial part of the plant. Diuretic, dropsy, bone pain: eat berries.
Pteridium aquilinum (L.) Kuhn	Dennestaedtiaceae	bujad, poprata trava	Diuretic: tisane from the aerial part of the plant.
Rubia tinctorum L.	Rubiaceae	broć	Anemorrhoea: root powder or decoction of root in wine. Inducing birth, the afterbirth, remove a dead fetus: cense with leaves. Skin diseases: poultice of root juice with honey.
Scrophularia nodosa L.	Scrophulariaceae	gugutina trava	Treatment of old bruices: poultices of macerated roots. Inflamed and swollen glands: poultices of Schrophullaria root on a tobacco leaf coated with honey.
Sedum album L.	Crassulaceae	zebrice, bijeli žednjak	Warts: dropp of fresh juice.
Serratula tinctoria L.	Compositae	bojadisarski srpac	No data
Smilax aspera L.	Smilacaceae	tetivka	Anemorrhoea: decoction of plant (cut into small pieces). Drink on an empty stomach.
Sonchus arvensis L.	Compositae	poljski ostak	Hydro/varicocele: poultices made from a decoction of powdered Sonhus in pine resin and wax.
Sonchus oleraceus L.	Compositae	zmijina trava, kostriš	Snake bite: a poultice of the aerial part mixed with honey.
Sorghum bicolor (L.) Moench	Poaceae	sirak	Diarrhea: drink seed powder with wine. Anemorrhoea: take flower powder.
Squilla maritima (L.) Steinh	Asparagaceae	repa morska, morski luk	Worms: plant juice. Dropsy and difficult urination: plant decoction.
Symphytum tuberosum L.	Boraginaceae	žuti gavez	Wound treatment: poultice for superficial wounds.
Taxus baccata L.	Taxaceae	tisa	Magic rituals. Tuberculosis: root decoction. Leave the bark decoction overnight and drink it in the morning. Epilepsy: decoction of bark with butter. Drink 40 days.
Tulipa sylvestris L.	Liliaceae	tulipan, dulipan	No data
Typha angustifolia L.	Typhaceae	maca, rogoz	Syphilis: decoction of mixed roots of: Tifa, Common Polypody and common hollyhock and leave overnight. Drink in the morning
Ulmus laevis Pall.	Ulmaceae	brijest, bijeli brijest	Eczema: boil the bark in milk and rinse.
Ulmus minor Mill.	Ulmaceae	obični brijest	Caries: boil an elm leaf and brush teeth with that water.
Veratrum album L.	Melanthiaceae	čemerika bijela	Fever: Dried root ground into a powder with water. Bruices: cense with root.

			Internal diseases: decoction in hot brandy of: Gentiana lutea, Ammonium chloride, Artemisia vulgare, Veratrum. Drink on an empty stomach.
Veratrum nigrum L.	Melanthiaceae	kukurijek, čemerika crna	See *Veratrum album*. Long-term wounds: poultice of flower
Viburnum lantana L.	Viburnaceae	fudikovina, kalina, crna hudika	Hair loss: decoction of leaves and berries. Periodontitis: decoction with water and wine. Rinse
Vincetoxicum hirundinaria Medik.	Apocynaceae	drinjak, bijeli lastavnjičnjak	Snake bite, dropsy, detox: root decoction with wine