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ORIGINAL RESEARCH PAPER

A century of changes in wild food plant use in coastal Croatia: the example of Krk and Poljica

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Abstract
The aim of this study was to document the use of wild foods in two locations in the coastal part of Croatia – on the island of Krk and in the Poljica area, near Split. We chose these places as they have historical data on plant use (1900 and 1903 respectively). We carried out 67 interviews in Poljica and 55 interviews in Krk to estimate the current use and knowledge of wild foods. Altogether, 80 species of wild food and herbal tea species of plants were recorded in Poljica and 76 in Krk. On average, 13.2 species were listed by per interview in Poljica, including 7.1 species of wild vegetables, and in Krk 14.6 species, including 7.9 species of wild vegetables. Out of the list of plant names recorded in the past, in Krk, we identified 82% of the taxa and in Poljica 86%.

Keywords
ethnobotany; wild vegetables; wild edible plants; Dalmatia; Kvarner; Mediterranean diet

Introduction

Due to the increasing availability of agricultural crops, the knowledge and use of wild edible plants has been decreasing in Europe and on a worldwide scale [1,2]. One of the domains where this change is most profound is the use of wild greens. They were used in the majority of human populations, especially in times of food scarcity, but nowadays their consumption survives mainly in regions where they are regarded as healthy food [1–10]. One of the areas where the use of non-cultivated vegetables is still relatively common is the Mediterranean part of Europe. It is sometimes even said that eating wild greens is a "hidden" part of the Mediterranean diet [11,12]. However, even there this use is declining [10,12–17]. The decrease in the usage of other categories of wild foods in the Mediterranean is probably less profound (e.g., [15,18]).

A striking feature of the wild vegetable mixes found in the Mediterranean part of Europe is the use of the leaves of numerous species regarded in other countries as toxic or having a "strong taste", often with medicinal properties. Thus, recording of the use of wild vegetables is important also from the toxicological point of view. This is also the case in Croatia and in Bosnia and Herzegovina, where among the wild vegetables consumed, some had not been reported as edible before [15,16].

The worrying changes in traditional knowledge urge us to document the remaining scraps of this heritage. However, it is very rare to be able to measure such transformations, due to the lack of older ethnobotanical studies. In Central Europe, the nineteenth- and early twentieth-century use of plants by peasants, both for food and medicine, was well studied (e.g., [6,19–22]). On the other hand, in the south of Europe fewer such studies were made [23–25]. A notable exception to this is Croatia, with interesting ethnobotanical data published at the turn of the nineteenth and twentieth century.

Revisiting places where oldest ethnobotanical studies were performed has foremost importance for ethnobotany [26–33].

Wild food and medicinal plant use in selected areas of Croatia were documented in several studies [13,16,34–36]. All these studies show that the use of wild vegetables in coastal Croatia has been widespread and is to some degree practiced today. Łuczaj and Dolina made a comparison between wild vegetables listed in an old ethnographic paper from 1913 and the current use in the neighboring part of Bosnia-Herzegovina [15]. It showed that over half of the wild vegetables used previously are still used. The aim of our study was to make a similar comparison for coastal areas in Croatia. We were inspired by information on plant uses in the early twentieth century, published following a call [37] made in 1897 by Antun Radić. He asked ethnographers to collect ethnographic data on the local life of Croatian peasants, including plant usages. In the following years, several monographs were produced which depicted rural life. Only two of these reports concern coastal Croatia: Vrbnik on the island of Krk (Kvarner Archipelago, northern Adriatic) and the region of Poljica in central Dalmatia (southern Croatia).

The use of plants on the island of Krk was described by Ivan Žic in 1900 [38] in one of the parts of the monograph of the town of Vrbnik [38–42] (Tab. 1).

The local priest and ethnographer Frano Ivanišević (1863–1947) [43], published a five-part ethnographic monograph of the Poljica region, an area east of Split [44–48]. One of the parts contains detailed ethnobotanical characteristics of the region [44] (Tab. 2).

The aim of the study was to compare wild food plant use (with special reference to wild vegetables) nowadays to the uses reported in the archival materials from the turn of the twentieth century.

Material and methods

Study site in Krk

Krk is the second largest island of the Kvarner Archipelago in northern Adriatic Sea (Fig. 1, Fig. 2). It has an area of 428 km^2. Since 1980 it has been connected to the mainland by a 1.4-km bridge, which makes it easily accessible from the nearby city of Rijeka. Žic's paper concerns the parish of Vrbnik, which comprised the little fortified coastal town of Vrbnik and two villages: Risika and Garica.

Krk is a part of the Liburnian Karst Area. The island is now strongly overgrown by secondary forest dominated by *Quercus pubescens*, *Carpinus orientalis*, and *Fraxinus ornus*. In the past (pre-World War II) most of the island territory was grassland. The potential natural vegetation of most of the area is sub-Mediterranean *Quercus pubescens* forest, but some evergreen *Q. ilex* forests also exist [49].

Krk is located in the temperate Mediterranean climate zone. The average annual temperature is 14°C and the average annual amount of precipitation is about 1100 mm. Precipitation is not evenly distributed – the most rainfall occurs in fall, and summer is a drought period [50].

Arable land and meadows occupy 4339 ha (33.3% of total agricultural land, and 13% of the land surface), and predominantly karst pastures of low quality cover 9795 ha (66.7%) [50]. Most of the pasture land is undergoing further succession to woodlands.

In 2011, a total of 19 383 inhabitants lived on the island, with the largest number (3730) in the town of Krk. The town of Vrbnik had 1260 inhabitants [51].

Fig. 1 The location of the study sites in Southern Europe.

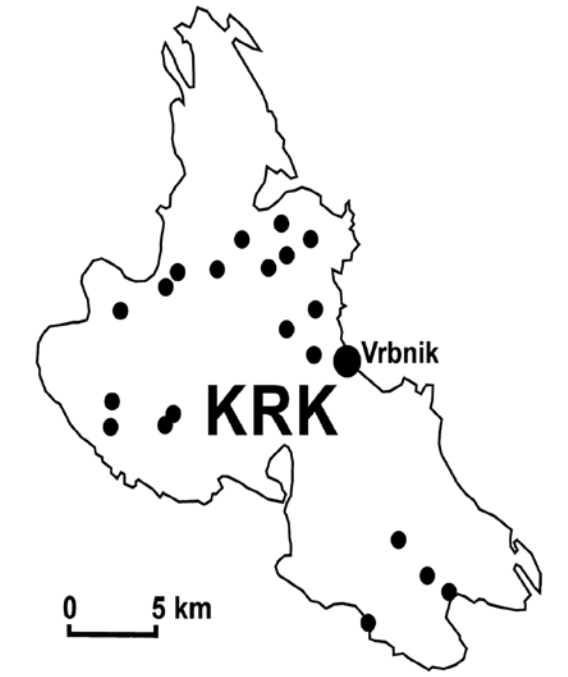

Fig. 2 The island of Krk – distribution of the studied villages (smaller circles).

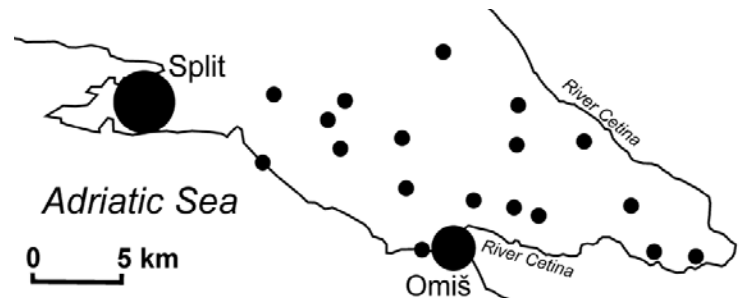

Fig. 3 Poljica – distribution of the studied villages (smaller circles).

Study site in Poljica

The territory of Poljica (ca. 250 km^2) occupies an area south of the city of Split, between the rivers Žrnovnica and Cetina and Adriatic Sea (Fig. 1, Fig. 3) [52]. According to the population census of 2011 [51] there were 23 037 inhabitants in the area of Poljica [Donja (Lower) P. – 70.4%, Srednja (Middle) P. – 25.4%, Gornja (Upper) P. – 4.2%] in 2011, whereas in 1903 [44] there were 11 129 inhabitants in Poljica (Lower P. – 22.3%, Middle P. – 51.4%, Upper P. – 26.3%).

The climate is Mediterranean. The average annual amount of precipitation in the narrow strip next to the sea is 1000–1250 mm. Further inland, it grows (1250–1500 mm) following the altitude. Average annual temperature is 12–14°C, yet close to the sea it is a few degrees higher, 14–16°C [53].

The vegetation of Poljica was represented by climax associations *Fraxino orni-Quercetum ilicis*, *Querco pubescenti-Carpinetum orientalis* and their degradation stages [54]. Nowadays, there is progressive succession of vegetation due to the abandonment of pastures.

For centuries, Poljica has had a specific independent self-government, although it has never been fully independent administratively [55].

Interviewing and the studied population

The research was carried out following the American Anthropological Association Code of Ethics [56] and the International Society of Ethnobiology Code of Ethics [57]. Data were collected mainly using the free listing method, accompanied by informal walks with selected key informants, from March to September 2015, mainly in spring. The informants were selected using snowball technique or encountered during their work in the fields. Interviews were carried out in Croatian. The interviews were performed in 18 settlements in Poljica: Podstrana (Donja, Gornja, and Sv. Martin), Duće, Žrnovnica, Donje Sitno, Gornje Sitno, Dubrava, Srinjine, Tugare, Gata, Ostrvica, Čišla, Kostanje, Podgrađe, Seoca, Donji Dolac (Rošca), Gornji Dolac, Srijane (Nečaj, Radovići, Vela Njiva), Trnbusi, and 21 settlements in Krk: Baška, Dobrinj, Draga Baščanska, Gabonjin, Garica, Jurandvor, Kosić, Kras, Milovčići, Oštrobradići, Polje, Poljica near Malinska, Risika, Stara Baška, Sv. Vid, Škrpčić, Tribulje, Vrbnik, Vrh, Žgaljić, and Županje.

In both places, the majority of the population of these areas is Croatian (Roman-Catholic), although people from many countries (mainly Slovenians) buy summer houses on Krk. However, in this study only Croatian people who were born in the study area and/or spent most of their lives there were interviewed.

Participants were approached outside, during their farm work, or were selected based on their recommendation as the most knowledgeable people in the village.

In Poljica, 67 interviews were conducted. This included 58 single informants and nine interviews with two or three people (altogether 77 people: 51 women,

26 men). The mean age of informants was 67, and the median 66, with the oldest informant aged 89, and the youngest 37.

On Krk, we obtained data from 55 interviews involving 47 single informants, and eight interviews involving two or three people. Altogether, 65 people took part in the study in Krk: 31 women and 34 men. The mean age of informants was 67, and the median 68, with the oldest informant aged 90, and the youngest 24.

The participants were asked their age, place of origin, and habitation. Then, they were asked the following questions:

1. "What wild vegetables have you collected?"
2. "What wild roots have you collected?"
3. "What wild fruits have you collected?"
4. "What wild mushrooms have you collected?"
5. "What wild plants do you use for tea?" Purely medicinal context was excluded.

Voucher specimens were collected and deposited in the herbarium of the Faculty of Biology of Warsaw University (WA) – for Poljica and in the herbarium of the Faculty of Agriculture of Zagreb University (ZAGR) – for Krk. Plant names used follow The Plant List [58]; fungi names follow Species Fungorum [59].

The division between wild and domesticated species is often blurred [1,18]. Several taxa (mainly fruits and aromatic herbs) listed by the informants occur both in the wild and domesticated state. We included them in the species list if we observed wild or feral populations of these species in the study area.

Results

Krk

Out of 34 plant names mentioned by Žic for Krk, 28 (82%) were recognized nowadays and 26 still used (76%), although only a small proportion of these species are used more commonly (Tab. 1). All the fruits mentioned by Žic are used, apart from one unidentified Fabaceae plant. Out of the identified wild vegetables, two are not used any more (Fig. 4).

Among the 12 most commonly used wild food plants (and mushrooms) were *Asparagus acutifolius* L., *Foeniculum vulgare* Mill., *Urtica dioica* L., *Rosa canina* L., *Cornus mas* L., *Taraxacum* spp., *Sonchus* spp., *Dioscorea communis* (L.) Caddick & Wilkin, *Clematis vitalba* L., *Cantarellus cibarius* Fr., *Diplotaxis muralis* (L.) DC, and *Rubus ulmifolius* Schott. (Tab. 2).

Altogether, 76 species of wild food and herbal tea plants and nine mushroom taxa were recorded as used nowadays in the area (Tab. 2). Among the listed species are 31 species whose wild leaves are used for raw salad or cooked dishes, 18 species with edible fruits, and 21 species whose leaves, shoots, fruits, or flowers are used for everyday herbal teas. On average, 14.6 species (median = 14) were listed per interview (maximum 32 species), including: 7.9 species of wild vegetables (median 8, maximum 16), 3.4 species of fruits (median 4, maximum 8), 1.5 species of fungi (median 1, maximum 6), and 1.8 species used for herbal teas or drinking syrups (median 1, maximum 7).

Poljica

Out of 21 plant names mentioned by Ivanišević for Poljica (Tab. 3), 18 are identified. Unfortunately, four are not used. Out of the remaining 14 taxa, only half are used more commonly.

Among the 12 most commonly used wild food plants were *Sonchus olearaceus* L., *Rosa canina* L., *Cichorium intybus* L., *Asparagus acutifolius* L., *Allium ampeloprasum* L., *Rubus ulmifolius* Shott., *Foeniculum vulgare* Mill., *Dioscorea communis* (L.) Caddick & Wilkin, *Salvia officinalis* L., *Juniperus oxycedrus* L., *Papaver rhoeas* L., and *Prunus spinosa* L. (Tab. 4).

Tab. 1 Comparison of wild food taxa used on Krk and mentioned by Žic with the results of our ethnobotanical study.

Local names in 1900 – Latin names or/and descriptions given by Žic were given in square parentheses	Latin name given in this study	Frequency of food use and remarks
Wild vegetables ("grasses")		
Beršača [*Butrum porcinum*]	Unidentified*	
Blušć [*Vitis nigra*]	*Dioscorea communis* L.	Occasionally
Dešeno	Unidentified	
Dibja lobodica	*Chenopodium album* L.	Occasionally
Fraterska sparožina, ošja sparožina (and later in the index: fraterska sparogi, kataruska [*Ruscus sylvestris*], *Myrtus*)	*Ruscus aculeatus* L.	Rarely
Hmej [*Lupulus humulus*]	*Humulus lupulus* L.	Very rarely, only in the past
Kiseličina, kiselica [*Rumex acetosa*]	*Rumex pulcher* L. or *R. acetosa* L.?	Occasionally as a snack
Kromač, koromač [*Foeniculum*]	*Foeniculum vulgare* Mill.	Frequently
Mek [*Papaver sylvestre*]	*Papaver rhoeas* L.	Rarely
Merkvina [*Pastinaca*], also the name merkvica [*Daucus*] listed by the former not as edible	Only mrkva identified as *Daucus carota* L.	Rarely
Ostek [*Sonchus*]	*Sonchus* spp.	Frequently
Ožigavica, ožigavičini [*Urtica urens*]	*Urtica dioica* L.	Occasionally
Poposke kńigi	Unidentified	
Prava tertina [*Clematis vitex*]	*Clematis vitalba* L.	Rarely
Prave pečurvi, prave pečuri [white at the top, black underneath]	*Agaricus* sp.	Occasionally
Riga [*Eruca*]	*Diplotaxis muralis* (L.) DC	Frequently
Šćav, šćavina, šćavić [*Rumex oxalis*]	*Rumex pulcher* L.	Rarely
Šćur [*Blitum*]	*Crithmum maritimum* L. and *Amaranthus* spp.	Rarely
Sikavec [only young, *Carduus*, *Eryngium*]	A variety of spiny Compositae	Rarely in the past
Sparogi, sparožina, sparogva [*Asparagus*]	*Asparagus acutifolius* L.	Frequently
Tučen [*Portulaca*]	*Portulaca oleracea* L.	Rarely
Vardica	Unidentified	
Vešca [*Flammula jovis*]	*Silene latifolia* Poir.	Rarely
Želtenica pojska [*Cichorium*]	*Cichorium intybus* L., *Taraxacum* spp.	Frequently
Želtenica tersovna [*Cichorium*]	Unidentified	
Fruits and seeds		
Černe glogoviće, černi glog [*Prunus sylvestris*]	*Prunus spinosa* L.	Rarely
Černe jagodi z ostrugi [*Rubus*]	*Rubus ulmifolius* Schott	Occasionally
Čevjene glogoviće [*Rhamnus oxyacantha*]	*Crataegus monogyna* Jacq.	Rarely
Drenulviće	*Cornus mas* L.	Occasionally
Grah [*Astragalus*, *Lathyrus carubica*]	Unidentified	Famine food, now forgotten

Tab. 1 Continued

Local names in 1900 – Latin names or/and descriptions given by Žic were given in square parentheses	Latin name given in this study	Frequency of food use and remarks
Klobučići (šoldi) od terna	*Paliurus spina-christi* L.	Rarely
Planičiće [*Arbutus*]	*Arbutus unedo* L.	Rarely
Popriviće [*Lotus*]	*Celtis australis* L.	Occasionally
Šipunićini od dibjega šipuna [*Rosa canina*]	*Rosa canina* L.	Occasionally

* Single informants mentioned similar names for *Reichardia picroides* (*brusača*) and for *Scolymus hispanicus* (*brisača*).

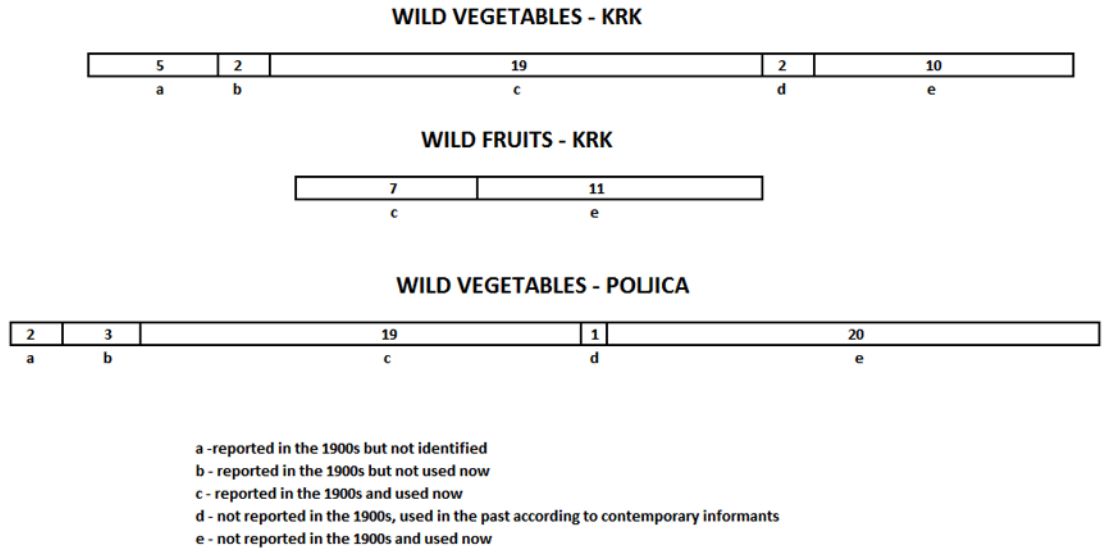

Fig. 4 Changes in the number of taxa used as wild vegetables at the turn of the nineteenth and twentieth century, and nowadays.

Altogether, 80 species of wild food and herbal tea plants were or are used in the area (Tab. 4). Among the listed species are 44 species whose wild leaves are used for raw salad or cooked dishes, 15 species with edible fruits, and 23 species whose leaves, shoots, fruits, or flowers are used for everyday herbal teas. Seven taxa of fungi were mentioned, but we could identify only four. On average, 13.2 species (median 13) were listed per interview (maximum 28 species), including: 7.1 species of wild vegetables (median 7, maximum 20), 4.2 species of fruits (median 4, maximum 10), 3.2 species used as herbal teas (median 3, maximum 10), and 0.2 species of fungi (median 0, maximum 7).

Discussion

Historical changes

Most plant taxa mentioned in the old ethnographic works are still used in Krk and Poljica (Tab. 1, Tab. 3, Fig. 4), which shows the remarkable resilience of the local food gathering traditions. In Krk, 19 species of wild vegetables were reported in 1900 and are still used to some extent, two are no longer used, five have not been identified, two were mentioned by current informants as famine foods but not listed in 1900, and 10 were listed in our study but were not mentioned in 1900. All the fruits listed in 1900 in

Tab. 2 Wild food plants and fungi used on the island of Krk. Those mentioned by Žic are given in bold.

Scientific name	Local name	Part used*	Use	No. of use reports $N = 55$	Voucher specimen number (Id) in the collection of ZAGR
Achillea millefolium L. (Compositae)	Hajdučka trava, stolisnik	fl, l	Infusion	5	39685
Agaricus sp. (Agaricaceae)	Pečurka, šampinjon	m	Fried	13	-
Allium ampeloprasum L. (Amaryllidaceae)	Lučica, divlji luk, poriluk, lučica, divlji češnjak, divlji lučić	wh	Raw, boiled	9	39321, 39319
Althaea sp. (Malvaceae)	Poljska alteja, bijeli sljez	l	Infusion	1	-
Amanita caesarea (Scop.) Pers. (Amanitaceae)	Carska gljiva, blagva	m	Fried	1	-
***Amaranthus* cf *retroflexus* L. (Amaranthaceae)**	Šćur, poljski šćur, štir	l	Boiled	4	39998
***Arbutus unedo* L. (Ericaceae)**	Planičići, planičiki, planika	f	Raw, rakija**	6	39683
Armoracia rusticana P. Gaertn., B. Mey. & Scherb. (Brassicaceae)	Hren	r	Spice	2	39661
Artemisia absinthium L. (Compositae)	Pelin	fl, l	Infusion, rakija	5	39705
Arum italicum Mill. (Araceae)	Strtok	l	Cooked as famine food	1	39320, 39322
***Asparagus acutifolius* L. (Asparagaceae)**	Šparoga, šparogva	s	Boiled, fried	49	39311
Asphodeline lutea (L.) Rchb. (Xanthorroeaceae)	Brdej	r	Famine food	1	39004
Beta vulgaris L. (Amaranthaceae)	Divlja blitva	l	Boiled	1	-
Boletus edulis Bull. (Boletaceae)	Vrganj	m	Fried	16	-
Clinopodium nepeta (L.) Kunze (Lamiaceae)	Divlja metica	fl, l	Infusion	2	39686
Calvatia sp.? (Agaricaceae)	Puhavica	m	Fried	1	-
Cantarellus cibarius Fr. (Cantarellaceae)	Lisičarka, lisička	m	Fried	22	-
***Celtis australis* L. (Cannabaceae)**	Koprivić, pokrivić, pokriva	f	Raw	14	39714
***Chenopodium album* L. (Amaranthaceae)**	Loboda, lobodica	l	Boiled	13	39696
***Cichorium intybus* L. (Compositae)**	Divlji radič, divlji radić	l	Raw, boiled	12	39706
***Clematis vitalba* L. (Ranunculaceae)**	Trtina, trta, trtvina	s	Boiled	27	39310, 39698

Tab. 2 Continued

Scientific name	Local name	Part used*	Use	No. of use reports $N = 55$	Voucher specimen number (Id) in the collection of ZAGR
Convolvulus arvensis L. (Convolvulaceae)	Zlak, slak	l	Boiled, only famine food	1	40001
***Cornus mas* L. (Cornaceae)**	Dren, drenka, drenjula, drenjulvić, drenulika, drenutka etc.	f	Raw, jam	31	39715
***Crataegus monogyna* Jacq. (Rosaceae)**	Glog cerveni, glogovići, glogoviki, glogujka	f	Raw, rakija	6	39701, 39816
Craterellus cornucopioides (L.) Pers. (Cantarellaceae)	Trubača	m	Fried	1	-
***Crepis sancta* (L.) Babc. (Compositae)**	Poljska željtenica, žutenica čupava, maslačak	l	Raw, boiled	4	39316, 39317
***Crithmum maritimum* L. (Apiaceae)**	Šćur (pri)morski	l	Boiled, in the past	4	39302, 39604
***Daucus carota* L. (Apiaceae)**	Divlja mrkva	l, r	Boiled	3	39314, 39689
***Dioscorea communis* (L.) Caddick & Wilkin (Dioscoreaceae)**	Bl(j)ušć, bl(j)ušt	s	Boiled/fried	28	39307, 39703
***Diplotaxis muralis* (L.) DC (Brassicaceae)**	Odra, divlja riga, poljska riga	l	Raw	22	39191, 39694
Eryngium sp. (Apiaceae)	Brmeč	r	Boiled in the past (in Stara Baška)	1	39656
***Foeniculum vulgare* Mill. (Apiaceae)**	Kromač, koromač	l	Boiled, in rakija, also as spice for sauces and coffee	44	39313
Fragaria vesca L. (Rosaceae)	Šumska jagoda, divlja jagoda	f	Raw	4	39997
***Humulus lupulus* L. (Cannabaceae)**	Hmej	s	Boiled, in the past	2	39194
Hypericum perforatum L. (Hypericaceae)	Gospina trava, kantarion, svetog ivana rožica	fl, l	Infusion	8	39709
Infundibulicybe geotropa (Bull.) Harmaja, syn. *Clitocybe geotropa* (Bull.) Quél. (Tricholomataceae)	Martinčice, martinka	m	Fried	7	-
Juglans regia L. (Juglandaceae)	Orah	f	Raw, rakija, cakes	2	39700
Juniperus oxycedrus L. (Cupressaceae)	Šmrkujići, šmrkujiki, šmrika	f	Rakija, jam	3	39691

Tab. 2 Continued

Scientific name	Local name	Part used*	Use	No. of use reports $N = 55$	Voucher specimen number (Id) in the collection of ZAGR
Knautia integrifolia (Honck. ex L.) Bertol. (Dipsacaceae)	Rešetnica	l	Boiled	3	39815
Laurus nobilis L. (Lauraceae)	Lovor, lovorika, javorka	l	Spice	3	39713
Macrolepiota sp. (Agaricaceae)	Sunčanica	m	Fried	12	-
Malus sp. (Rosaceae)	Divlja jabuka	f	Cakes, compotes	2	39716
Malva neglecta Wallr. (Malvaceae)	Bjeli sljez	fl, l	Infusion	3	39610
Malva sylvestris L. (Malvaceae)	Črni sljez	fl, l	Infusion	3	39655
Matricaria chamomilla L. (Compositae)	Divlja kamomila, kamilica	fl	Infusion	3	39695
Melissa officinalis L. (Lamiaceae)	Matičnjak, melisa	fl, l	Infusion	2	39702
Mentha spp. (*M. piperita* L., *M. longifolia* (L.) L., *M. spicata* L.; Lamiaceae)	Metvica	fl, l	Infusion	2	39717 (lo)
Morus alba L., *M. nigra* L. (Moraceae)	Murva, murvići	fr	Raw, preserves	4	39664
Muscari comosum (L.) Mill. (Asparagaceae)	Fratar	wh	Raw?	1	-
Nasturtium officinale L. (Brassicaceae)	Kreš, kriš, potočarka	l	Salad	3	-
***Paliurus spina-christi* Mill. (Rhamnaceae)**	Klobučice, klobučići, bečići, diraka	f	Raw	4	39704
***Papaver rhoeas* L. (Papaveraceae)**	Mak, mek	l, fl	Boiled leaves in mixed veg, flowers in rakija	15	39315, 39654
Parietaria judaica L. (Urticaceae)	Šćurenica	l	Infusion	2 (more often as medicine for kidneys)	39304, 39318
Plantago lanceolata L., *P. major* L., *P. media* L. (Plantaginaceae)	Trputac	l	Infusion	5	39306 (la), 39699 (ma), 39712 (me)
***Portulacca oleracea* L. (Portulaceae)**	Tučen, tučanj	l	Boiled	8	39996
Prunus domestica subsp. *insititia* (L.) Bonnier & Layens. (Rosaceae)	Amulići, amul, cibor	f	Raw, preserves	8	39690

Tab. 2 Continued

Scientific name	Local name	Part used*	Use	No. of use reports $N = 55$	Voucher specimen number (Id) in the collection of ZAGR
***Prunus spinosa* L. (Rosaceae)**	Crni glog	f	Raw, in rakija	7	-
Pyrus amygdaliformis Vill. (Rosaceae)	Dibje kruškice, divlja kruška	f	Raw	2	39817
Ramaria spp. (Gomphaceae)	P(e)rstiči, p(e)rstiki	m	Fried	7	-
Reichardia picroides (L.) Roth (Compositae)	Brusača	l	Raw, boiled	1	39651
Robinia pseudoacacia L. (Leguminosae)	Kacia, bagrem	fl	Raw, jam	1	39818
***Rosa canina* L. (Rosaceae)**	Šipunići	f	Infusion, jam	34	39305, 39662
***Rubus ulmifolius* Schott (Rosaceae)**	Kupina, ostruga, zimujići	f	Raw, jam	22	39711
***Rumex pulcher* L. (Polygonaceae)**	Kiselica, šćav, divlja blitva	l	Raw	13	39692
***Ruscus aculeatus* L. (Asparagaceae)**	Kataroška, fraterska šparožina	s	Boiled	18	39308, 39665
Ruta graveolens L. (Rutaceae)	Ruta	fl, l	Rakija	8	39708
Salvia officinalis L. (Lamiaceae)	Kuš, kadulja	fl, l	Infusion, syrup from flowers used for rakija	15	39697
Sambucus nigra L. (Adoxaceae)	Bazga	fl, f	Syrup (flowers), wine, jam (fruit)	9	39688
Scolymus hispanicus L. (Compositae)	Brisača	l	Boiled, in the past	1	39658
***Silene latifolia* Poir. (Caryophyllaceae)**	Ušca, vešca	l	Boiled	11	39195
***Sonchus asper* (L.) Hill., *S. oleraceus* L. (Compositae)**	Ostek, ostak, špilišor	l	Boiled	29	39303, 39309
Sorbus domestica L. (Rosaceae)	Oksoruša, oksorušva	f	Raw, jam	13	39663
***Taraxacum* section *Ruderalia* (Compositae)**	Željtenica (poljska), maslačak	l	Raw, boiled	31	39312
Teucrium montanum L. (Lamiaceae)	Iva trava	fl, l	Infusion, rakija	2	-
Thymus spp. including *T. longicaulis* C. Presl (Lamiaceae)	Majčina dušica	fl, l	Infusion	8	39653
Tilia cordata Mill. and other *Tilia* spp. (Tiliaceae)	Lipa	fl	Infusion	5	39319 (co), 39718 (to)

Tab. 2 Continued

Scientific name	Local name	Part used*	Use	No. of use reports $N = 55$	Voucher specimen number (Id) in the collection of ZAGR
***Urtica dioica* L. (Urticaceae)**	ož(i)gavica, už(i)gavica pokriva, kopriva	l	Infusion, boiled	41	39649
Viola odorata L. (Violaceae)	Ljubičica	fl	Nectar sucked	1	39660
Unidentified Leguminosae	Divlji bižˇ	f	Famine food	1	-
Unidentified Compositae	Beli trn, šikavec (the former is a collective term for various spiny plants as well)	l	Boiled, in the past	5	-

* fl – flowers, flower buds, or inflorescences; l – leaves; m – mushroom's fruiting bodies; r – underground organs; wh – whole plant; s – pencil-like young shoots; f – fruits. ** Rakija – home-made grape liqueur to which often plant material is added as spice (fruits, leaves).

Krk are still used and 11 new edible fruit species are reported (Fig. 4). In Poljica, mainly wild vegetables were listed in 1903. Nineteen species of wild vegetables were reported in 1903 and are still used to some extent nowadays, three are no longer used, two have not been identified, one was mentioned by current informants as famine food but not listed in 1900, and 20 were listed in our study but not mentioned in 1903 (Fig. 4).

Although the list of taxa whose use was newly recorded in the study area is longer than the list of taxa which are no longer used or whose names were forgotten, it is difficult to take this as proof of an increase in gathering activities. Quite on the contrary, most taxa are used by a small percentage of the population and the large number of taxa still recorded stems from the fact that our research must have been much more detailed and intense than the ethnographic notes given by Žic and Ivanišević.

The comparison of Krk and Poljica

Generally, the overall numbers of species used in each category, as well as the average numbers of species used per interview in both study areas are nearly identical. The only major difference is the use of mushrooms: few species are collected by a sizeable part of the population on the island of Krk, and fungi are hardly collected at all in the sparsely wooded Poljica. As far as plants are concerned, the differences are expressed by the composition of the species lists, e.g., *Clematis vitalba* L., *Knautia integrifolia* (L.) Bertol., and *Crithmum maritimum* L. Those species are used only in Krk, even they are common in Poljica as well.

A wild vegetable mix is still made by many elderly people in Poljica, although it usually consists of a few of the most common roadside and garden weeds. On Krk, extremely few people make mixed cooked wild vegetables any more, although many people tasted them in their childhood. It is now more common to use just one species of leafy vegetables separately (usually *Urtica dioica* and *Sonchus* spp.). In the past, wild vegetables were often cooked together with potatoes, and making such a dish is still practiced by some inhabitants of the island. Asparagus-like plants (i.e., those eaten as pencil-shaped shoots coming out of the ground) are more popularly eaten than leafy vegetables. They are cooked separately and mixed with boiled eggs or fried with eggs. In both areas, wild asparagus *Asparagus acutifolius* is used the most, to a lesser extent black bryony *Dioscorea communis*. On Krk, some people still eat the shoots of *Ruscus aculeatus* L. (Fig. 5) and *Clematis vitalba*, and many more tasted them in childhood but do not gather them nowadays. No one eats the *Humulus lupulus* shoots mentioned by Žic anymore. In both places, *Diplotaxis*, *Taraxacum*, and *Cichorium intybus* are sometimes used to make salads (raw or blanched).

In both areas wild fruits are mainly eaten raw, but also made into jams and alcoholic drinks and dried for herbal teas.

Mushroom collecting is hardly practiced in Poljica (which is mainly deforested, with shrubland dominating the landscape). In Krk, about half of the respondents collect mushrooms. It should be noted that although a mushroom gathering tradition already existed in Žic's times, but it has been enhanced by the influx of summer house owners from inland Slovenia and Croatia, for whom mushroom gathering is more important.

Contrary to our expectations, we found more unusual wild food plant uses in Krk than Poljica. We regard eating *Knautia integrifolia* and *Clematis vitalba* as such, as discussed in detail in the last part of

Tab. 3 The comparison of wild food taxa used in Poljica mentioned by Ivanišević with the results of our ethnobotanical study.

Local names in 1903 – Latin names or/and descriptions given by Ivanišević were given in square parentheses	Latin name given in this study	Frequency of food use and remarks
Blušć [*Tamus communis*]	*Dioscorea communis* (L.) Caddick & Wilkin (= *Tamus communis* L.)	Frequently
Gusmača	Not identified, not known	
Jagoda	*Rubus* spp. or/and *Fragaria vesca* L.	Occasionally
Kokošija jetrica	*Viola arvensis* Murray	Very rarely
Koromač [*Foeniculum officinale*]	*Foeniculum vulgare* L.	Still frequently used
Kostrič [*Sonchus oleraceus*]	*Sonchus* spp.	Still frequently used
Kozja brada [*Tragopogon pratensis*]	*Tragopogon* sp., *Scorzonera* sp.	Frequently
Lužańa [*Hyacinthus racemosus*]	*Muscari* sp., *Allium* sp.	Only in the past
Mäk [*Papaver*]	*Papaver rhoeas* L.	Occasionally
Mišakińa [*Anagalis arvensis*]	*Stellaria media* L.	Only in the past
Mrkva	*Daucus carota* L.	Rarely
Oskrušvica	Not known, probably a name for *Sorbus domestica* L.	
Podbila [*Tussilago farfara*]	*Tussilago farfara* L.	Not used as food
Šćir [*Amaranthus retroflexus*]	*Amaranthus* spp.	Very rarely
Šćirenica	*Parietaria judaica* L.	Used medicinally
Sparog [*Asparagus acutifolius*]	*Asparagus acutifolius* L.	Still frequently used
Šurlin [*Thlaspi bursa pastoris*]	*Capsella bursa-pastoris* (L.) Medik.	Only in the past
Tušć [*Portulaca oleracea*]	*Portulaca oleracea* L.	Occasionally
Vrtlarica	Not identified, not known	
Vučija stopica	*Ranunculus* sp.	Very rarely (one person)
Žutenica [*Cichorium intybus*]	*Cichorium intybus* L.	Still widely used

the discussion. A peculiarity of wild food cuisine in Poljica is the wide use of *Bunias erucago* instead of cabbage, which is cooked with red meat. *Bunias erucago* is highly appreciated and saved from weeding.

Comparison with other areas

The length of the whole list of wild foods (80 and 76) used in the two areas is very similar to those from other parts of coastal Croatia [13,16] and in Herzegovina [15]. For example, in the study from Dubrovnik we recorded 95 wild food species (19 per informant), in southern Herzegovina 82 species (14 per informant) and in the Zadar area 55 species (12 per informant). Also the proportion of the plant list (i.e., around half the list composed of wild vegetables, and a long list of plants used for herbal "recreational" teas) is typical for the Mediterranean in contrast to Central Europe where the use of fruits and mushrooms dominates over wild vegetables (e.g., [1,6,60]). The types of dishes made are also very similar to those made in other parts of the Mediterranean, i.e., cooked leafy vegetables, raw salads, jams, liqueurs, and herbal teas dominate.

Tab. 4 Wild food plants and fungi used in Poljica. Those mentioned by Ivanišević are given in bold.

Scientific name	Local name	Part used*	Preparation mode	No. of use reports $N = 67$	Voucher specimen number (starting from WA0000051)
Achillea millefolium L. (Compositae)	Stolisnik	fl, l	Infusion	1	768
Agaricus sp. (Agaricaceae)	Pečurka, šampinjon	m	Fried	6	-
Allium ampeloprasum L. (Amaryllidaceae)	Lukej, divji luk, divlji luk, przdej, divlji poriluk, poriluk	wh	Mixed boiled veg	51	808
Allium roseum L. (Amaryllidaceae)	Divja ljutika	wh	Mixed boiled veg	1	761
***Allium* sp. (thin leaves, chive-like; Amaryllidaceae)**	Lužanja	wh	Mixed boiled veg	2	811
***Amaranthus* sp. (Amaranthaceae)**	Šćirenica	l	Boiled veg	3	-
Arbutus unedo L. (Ericaceae)	Manjiga	f	Rakija**	1	-
Artemisia absinthium L. (Compositae)	Pelin	l	Infusion, rakija	2	760
Arum italicum Mill. (Araceae)	Zminac, zminjac	l	Boiled as famine food during World War II	5	807
***Asparagus acutifolius* L. (Asparagaceae)**	Šparoga	s	Boiled, fried	53	769
Asplenium ceterach L. (Aspleniaceae)	Paprat	wh	Infusion	2	770
Boletus sp. (Boletaceae)	Vrganj	m	Fried	4	-
Bunias erucago L. (Brassicaceae)	Grzdulja	wh	Mixed boiled veg	7	759
Cantharellusu cibarius Fr. (Cantarellaceae)	Lisičarka	m	Fried	2	-
***Capsella bursa-pastoris* (L.) Medik. (Brassicaceae)**	Gusumača	l	Mixed boiled veg	4	771
Celtis australis L. (Cannabaceae)	Koprnja, koprina, koprva	f	Raw, added to rakija	19	772
Cerastium sp. (Caryophyllaceae)	Zečje uvo	l	Mixed boiled veg	1	809
Chenopodium album L. (Amaranthaceae)	Loboda, laboda	l	Boiled	2	774
Chondrilla juncea L. (Compositae)	Tavka	l	Mixed boiled veg, salad	19	773
***Cichorium intybus* L. (Compositae)**	Žutenica, žutinica	l	Mixed boiled veg, salad, boiled	54	775

Tab. 4 Continued

Scientific name	Local name	Part used*	Preparation mode	No. of use reports $N = 67$	Voucher specimen number (starting from WA0000051)
Convolvulus arvensis L. (Convolvulaceae)	Slavak	l	Mixed boiled veg, only famine food	2	776
Cornus mas L. (Cornaceae)	Drin	f	Jam, raw	13	764
Crataegus monogyna Jacq. (Rosaceae)	Glog (crveni), gloginja	f	Raw	21	777
Cyclamen repandum Sibth. et Sm. (Primulaceae)	Pušilula, skrižalina	r	As famine food during World War II	1	813
***Daucus carota* L. (Apiaceae)**	Divja mrkva	l, r	Mixed boiled veg	5	778
***Dioscorea communis* (L.) Caddick & Wilkin (Dioscoreaceae)**	Blušć, blušt	s	Boiled, fried	39	779
Diplotaxis muralis (L.) DC, *D. tenuifolia* (L.) DC (Brassicaceae)	Riga	l	Raw for salads	2	816 (mu), 817 (te)
Ficaria verna Huds. (Ranunculaceae)	Bobolj, papučica	l	Mixed boiled veg, also bulbils were eaten	7	806
***Foeniculum vulgare* Mill. (Apiaceae)**	Koromač	l	Mixed boiled veg, also to spice rakija and pulse and meat dishes	41	814
***Fragaria vesca* L. (Rosaceae)**	Jagoda, šumska jagoda, divlja jagoda, mardekjuska, mrdeljuska, mrzdeuljka	f	Raw, sometimes jam	8	758
Helichrysum italicum (Roth) G. Don (Compositae)	Smilje, cmilje	l	Infusion	2	780
Helminthotheca echioides (L.) Holub (Compositae)	Rašpanjača, raška	l	Mixed boiled veg	9	781
Hypericum perforatum L. (Hypericaceae)	Gospina trava	fl, l	Infusion, also in medicinal rakija and oil	11	782
Juniperus macrocarpa Sm. (Cupressaceae)	Buvač, bubač	f	Raw	2	-
Juniperus oxycedrus L. (Cupressaceae)	Smrička	f	Raw, infusion, in rakija, also boiled in larger amounts as famine food into a kind of compote	29	783

Tab. 4 Continued

Scientific name	Local name	Part used*	Preparation mode	No. of use reports $N = 67$	Voucher specimen number (starting from WA0000051)
Lactuca serriola L. (Compositae)	Divlja salata	l	Mixed boiled veg	2	757
Laurus nobilis L. (Lauraceae)	Lovor	l	Spice, goulash type dishes, beans, rise dishes and to preserve dried figs	5	784
Macrolepiota sp. (Agaricaceae)	Sunčanica, sunčarka, sunčica	m	Fried	5	-
Malva sylvestris Wallr. (Malvaceae)	(Crni) sljez	wh	Infusion, mainly against cold	4	756
Matricaria chamomilla L. (Compositae)	Kamilica	fl	Infusion	4	785
Melissa officinalis L. (Lamiaceae)	Čelinja ljubica, matičnjak, metvica	fl, l	Infusion	3	786
Mentha spp. (Lamiaceae), e.g., *M. longifolia* (L.) L., *M. spicata* L.	Metvica	fl, l	Infusion	9	755 (lo), 818 (sp)
Morus alba L., *M. nigra* L. (Moraceae)	Murva	f	Raw, preserves, rakija	5	787 (al), 763 (ni)
***Muscari neglectum* Guss. ex Ten. (Asparagaceae)**	Lužanja	wh	Mixed boiled veg	3	815
Myrtus communis L. (Myrtaceae)	Mirta	f	Rakija	1	767
Origanum vulgare L. (Lamiaceae)	Mravinac	fl, l	Infusion	2	805
Paliurus spina-christi Mill. (Rhamnaceae)	Drača, šešir	f	Raw as children's snack, infusion against kidney diseases and diabetes	9	804
***Papaver rhoeas* L. (Papaveraceae)**	Kukurik, mak	l	Mixed boiled veg	24	754
***Parietaria judaica* L. (Urticaceae)**	Šćirenica	l	In the past used for food, now only medicinal kidney problems)	0	-
Picris hispidissima (Bartl.) W. D. Koch (Compositae)	-	l	Mixed boiled veg	2	753
Pinus halepensis Mill. (Pinaceae)	Bor	l	Syrup in honey for cough and asthma	1	766

Tab. 4 Continued

Scientific name	Local name	Part used*	Preparation mode	No. of use reports $N = 67$	Voucher specimen number (starting from WA0000051)
***Portulaca oleracea* L. (Portulacaceae)**	Tušt, tucanj	l	(Mixed) boiled veg	10	762
Prunus cerasifera Ehrh. (Rosaceae)	Šljiva, zerdelja, arzelinka	f	Raw, preserves	7	803
Prunus spinosa L. (Rosaceae)	Trn, trni, gloginje, crni trn, plavi trn, glog (plavi), glogovina	f	Raw	24	802
Pyrus amygdaliformis Vill. (Rosaceae)	Divlja kruška, trnjača, trnovača	f	Raw, usually eaten bletted	12	752
***Ranunculus* sp. (Ranunculaceae)**	Vučja stopica	l	Mixed boiled veg	1	810
Reichardia picroides (L.) Roth (Compositae)	Majčina dušica	l	Mixed boiled veg	8	801
Rosa canina L. (Rosaceae)	Srbiguzica, šipurika, šipak, svrbibabaguzica	f	Infusion, jam	55	751
Rosmarinus officinalis L. (Lamiaceae)	Ružmarin	l	Spice for meat, rakija	3	800
Rubus ulmifolius Shott. (Rosaceae)	Jagoda, kupina	f	Raw, jam, also in rakija, infusion	51	749, 750
Rumex pulcher L., *R. crispus* L. (Polygonaceae)	Ščavelj	l	Mixed boiled veg	1	747(pu), 748 (cr)
Ruscus aculeatus L. (Asparagaceae)	Zečica	s	Boiled or fried like asparagus	1	799
Salvia officinalis L. (Lamiaceae)	Kadulja	l	Infusion, syrup	33	798
Sambucus nigra L. (Adoxaceae)	Bazovina, zova	fl	Syrup	11	797
Satureja montana L. (Lamiaceae)	Vrisak	fl, l	Infusion	12	796
***Scorzonera laciniata* L., *S. villosa* Scop., *Tragopogon porrifolius* L. (Compositae)**	Kozja brada	l	Mixed boiled veg	20	794 (vi), 795 (la), 740 (Tr)
Silene latifolia Poir. (Caryophyllaceae)	Volujsko uho	l	Mixed boiled veg	1	793
Silene vulgaris (Moench) Garcke (Caryophyllaceae)	Škripavac	l	Mixed boiled veg	2	792
Sonchus oleraceus L. and other *Sonchus* spp. (Compositae)	Kostrič	l	Mixed boiled veg	59	745, 746

Tab. 4 Continued

Scientific name	Local name	Part used*	Preparation mode	No. of use reports $N = 67$	Voucher specimen number (starting from WA0000051)
Sorbus domestica L. (Rosaceae)	Oskoruša	f	Raw, dried for winter (bletted), also eaten fried with pork fat	7	791
***Stellaria media* L. (Caryophyllaceae)**	Mišakinja	l	Only in the past, only the name recognized nowadays	0 (not used now)	-
Taraxacum sect. *Ruderalia* spp. (Compositae)	Maslačak	l	Raw in salads, sometimes also added to mixed veg	18	743, 744
Teucrium montanum L. (Lamiaceae)	Ivica	fl, l	Infusion	10	789
Thymus longicaulis C. Presl (Lamiaceae)	Majčina dušica	fl, l	Infusion	6	790
Tilia spp. (Tiliaceae), e.g., *T. cordata* Mill., *T. tomentosa* Moench	Lipa	fl	Infusion	9	741 (to), 742 (co)
***Tussilago farfara* L. (Compositae)**	Podbila	l	Leaves?	0 (not used now)	-
Urtica dioica L. (Urticaceae)	Žigavica, kopriva	l	Mixed boiled veg, infusion	10	788
***Viola arvensis* Murray (Violaceae)**	Kokošja volja, kokošja jetrica	l	Mixed boiled veg	1	812
Unidentified mushroom	Čavlić	m	Fried	1	-
Unidentified mushroom	Šišarak	m	Fried	2	-
Unidentified mushroom	Šljive	m	Fried	1	-

* fl – flowers, flower buds, or inflorescences; l – leaves; m – mushroom's fruiting bodies; r – underground organs; wh – whole plant; s – pencil-like young shoots; f – fruits. ** Rakija – home-made grape liqueur to which often plant material is added as spice (fruits, leaves).

Fig. 5 Butcher's broom (*Ruscus aculeatus*). Young shoots (right) are eaten like asparagus, whereas mature branches are used for sweeping chimneys.

All the species of wild vegetables (and other kinds of wild foods as well) have been used in other parts of the Mediterranean (e.g., [8,10,12,14,16–18,61–65]). Probably the most interesting is the consumption of *Knautia integrifolia* in the western part of the island of Krk, whose alimentary use was only reported from Lucca, in Tuscany, Italy [66]. This genus has been rarely recorded as human food before. Apart from *K. integrifolia*, only the use of *Knautia arvensis* (L.) Coult. was recorded in Italy [67,68] The tradition of eating the bitter, asparagus-like shoots of *Ruscus* (occasionally on Krk, rarely in Poljica) and *Clematis* (only on Krk) is also worth emphasizing.

Clematis vitalba is the only *Clematis* species used for food. All the species of this genus contain protoanemonine, a substance which irritates the skin and the walls of the digestive tract [69]. The young shoots of *C. vitalba* are sometimes eaten (after boiling) in central and southern Italy [70,71]. On Krk, *C. vitalba* is known as *prava trtina* ("the right *Clematis*") to differentiate it from *Clematis flammula* L. that is regarded as inedible.

Ruscus aculeatus is a species widely used in herbal medicine against hemorrhoids and to strengthen veins. It acts as a natural vasoconstrictor with anti-inflammatory properties (underground parts are usually used). *Ruscus aculeatus* also has the unique ability to strengthen and tone veins [72]. A case of poisoning with this plant was recently described [73]. *Ruscus aculeatus* is rarely used as food. Previously, its gastronomic use was only recorded in Italy [17] and around Dubrovnik in Dalmatia [13]. Interestingly, it is also eaten by an ancient Croatian diaspora in southern Italy [74].

Conclusion

Most plant names recorded in 1900 and 1903 are still remembered, but many of them only by one or several older informants. The Croatian heritage of traditional knowledge concerning plants is in dire need of further research that will protect it from vanishing forever.

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