

Historical ethnobotanical review of wild edible plants of Estonia (1770s–1960s)

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Abstract

This paper is a historical ethnobotanical review of wild plants used by the residents of present day Estonia during the 1770s–1960s. Twenty two sources addressing historical ethnographical accounts of the use of wild food plants were analysed. The use of 149 taxa of vascular plants (over 6% of Estonian vascular flora) and two lichens has been recorded. Although the data does not allow for reliable determination of the frequency of use of specific taxa among the population, general conclusions on the preferences for specific dishes made of wild food plants can be made. While the category of snacks covers the largest proportion of species used, a substantial addition to food rations was provided by bread ingredients (used predominantly in famine times), green vegetables used for making soup, and later jams and other dishes of wild berries. Also beverages (tea and coffee substitutes), beer and beer-like drinks were widely made, and the saps of several tree species were consumed in fresh and fermented form. The most important species, according to the criterion of diversity of use, were *Carum carvi*, *Urtica dioica*, and the wild berries *Vaccinium vitis-idaea* and *Vaccinium myrtillus*.

Keywords: wild food plants, historical ethnobotany, wild snacks, food culture, ethnographic and folkloristic records, wild edible plants

Introduction

In the quite recent past, during times of war, crop failure or other cases of food shortage, wild food plants have made a substantial addition to the human diet [1,2]. Nowadays, for the vast majority of the population of modern urbanized Europe, wild food plants seem to be of secondary importance as a resource for human nutrition; their gathering requires much more human labour than cultivated crops and vegetables do, their habitats are far from human settlements, and due to the loss of contact with nature, people simply do not know (or cannot recognize) wild plants. Nevertheless, even in Europe there are still many rural locations, where wild food plants are traditionally used on a daily basis. Such locations in southern and Western Europe are much appreciated by researchers in the field of ethnobotany [3–13]. In Northern Europe the research seems to be completed and it seems that not much can be added to it, as in countries with high industrialization and safe social settings the need for wild food is close to zero and the existing ethnographic resources are already thoroughly researched (for a few examples see [14–16]).

A different situation exists in Eastern Europe within the post-socialist countries. The relatively recent open access to western goods still enables us to remember the use of wild plants on a national level, and research in these areas often gives fruitful results [17,18]. Moreover, some of these countries, like Estonia and its neighbours, have extensive ethnographic collections. While in some of the countries, such as Poland [19–21], such resources have been thoroughly analysed, the content of the others is still unknown to the rest of the world, as they are either not used after collection, or their analyses are published in the native languages only. This makes cross-cultural and geographical analysis difficult or even impossible [21].

To contribute a small stroke to the pattern of the use of wild plants of Europe from the Estonian side, we need first to review the historical use of wild food plants. The written legacy is rather thin: the few publications in German touching on the use of local species for food in the territory of present-day Estonia were written by Baltic German botanophiles [22–29]. Moreover, they often described Estonia and Livonia [22,23] together, some even including Courland [27,28], and they cover only the period until the mid-19th century. Subsequent times are covered by the memory of respondents to folkloristic and ethnographic surveys, and later discussed by a few enthusiasts in Estonian only – dominantly through popular science publications. Hence, the aim of the study is to critically review all the publications concerning wild edibles covering the period 1770s–1960s. The data collected after 1970 has not yet been reflected in any reliable written source, except for a few of the authors' publications.

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Material and Methods

Estonia – ecological and historical background

Estonia belongs to the boreo-nemoral vegetation zone, its vegetation is very diverse. Forests, mires and grasslands alternate with cultivated land; meadows and grasslands constitute up to one fifth of it, whereas almost half of the territory is covered with forests, including one third of the area covered by peaty soils, with mixed forest dominating [30–33]. The number of known native and naturalized vascular plant species (with micro-species) of Estonia is estimated at 2200 [34,35].

Present-day Estonia covers an area of 45 thousand km² with a population of 1.3 million inhabitants. Within the researched period, until 1918, Estonia was divided between two provinces of Russia (Estonia and Livonia); part of the latter now belongs to Latvia. Also a small area of the territory of present Estonia (Narva and its surroundings) belonged to the St. Petersburg province [36].

Definition of wild food plants

In the context of this article, the term “wild food plants” covers the popular category of wild plants in Estonia, referring mainly to plants growing without intended cultivation. It includes predominantly native and naturalized species, but also cultivars, if the sources suggest parts that are not usually eaten (like *Secale creale* L. and *Linum usitatissimum* L.), or plants, which are cultivated for non-food purposes (like *Aesculus hippocastanum* L.). Some of the species grow in the wild as well as in cultivated settings (like *Armoracia rusticana* Gaertn. et al. and *Ribes nigrum* L.).

The sources of the review

The documentation of traditions of plant use in Estonia began along with the start of documentation of Estonian flora [22], published by Baltic German Estophile, Pastor August Wilhelm Hupel (1737–1819). Although the list of plants was most probably compiled by the student of Carl Linnaeus, Jakob Benjamm Fisher (1731–1793) [34], additions on the use and local names were made by Hupel. Hupel's later work also contained some relevant data [23].

Another important figure in Estonian ethnobotany was a German doctor residing on Island Ösel, Johann Wilhelm Ludwig von Luce (1756–1842). He not only wrote an ethnographic overview of the use of plants growing on his home island [24], but also educated peasants on how to survive the times of famine by relying on wild plants [25]. In the same period there was one more attempt to popularise the use of the plants, by another Baltic German Estophile Pastor Johann Heinrich Rosenplänter (1782–1846), but this book is still a manuscript [29]. For more details on the three aforementioned figures and their impact on Estonian ethnobotany follow Kalle and Sõukand [37].

Although there were a few more pieces of information here and there [26–28,38], gathered until the beginning of the 20th century, they rather repeat previous authors and do not differentiate suggestions and ethnographic use reports.

The later publications could be divided into two categories: a critical review of previous authors, and folklore and ethnographical data, including published collections of folklore texts.

The oldest ethnographical data on the use of wild food plants originate from the last decades of the 19th century. However, the systematic collection of relevant information started

in the 1930s, when the Estonian National Museum and Estonian Folklore Archives published several questionnaires (e.g. [39–42]), addressing, among other subjects, the use of wild food plants. As the purpose of those collections was to save “antiquity”, the data was left untouched until “better times”.

The first researcher to analyse responses to the questionnaires from 1930 was ethnographer Aliise Moora (1900–1992). She published her short overviews in the then only popular natural science journal, *Eesti Loodus* [43–46]; also her monograph on the food of the peasants [47] contains some bits on the use of wild edible plants. Some pieces of this archival data, unpublished elsewhere, were also used in the authors' recent historical overview article in Estonian [48].

Nevertheless, the greatest ever collector and writer of the legacy of wild food plants was a doctor of botany, and for most of his life just a simple schoolteacher, Gustav Vilbaste (1885–1967). He collected his data on his own, mostly in 1920s–1930s, but some also later, until the 1960s. His profound analyses of the use of local plants contain not only his own data, but also critical reviews of earlier publications [49,50]. Still his most important work on wild edible plants is only a manuscript [51]. Another work, a monograph on the local plant names [52], was published almost 30 years after his death. Kalle and Sõukand [53] provide more information on Vilbaste's ethnobotanical impact.

We also use two sources publishing plain, un-commented folklore and ethnographic texts. The first of them, providing a few excerpts on edible wild plants within the framework of farm-life, was published before WW II [54]. The latter publication is an electronic database, containing predominantly data on the medicinal use of the plants, with a few pieces on wild edibles [55]; from it, only records collected before 1970 were evaluated. There are also two publications based on this database [56,57], but only the one published by Sõukand and Kalle [57] has been included in the present review, as the other deals, exceptionally, with medicinal plants. Moreover, as the article on “teetaimed” [57] is based on HERBA database [55], then if the plant was used only for making infusions and no additional data on other uses was available in the database, the published article became the only source in Tab. 1.

Altogether, 22 publications were used for this review. Nevertheless, as some of the publications rely on the same sources or repeat previous statements, and all the results are obtained using different methodologies, it is not reasonable to count the importance of the species based on the number of citations.

Methodology of plant identification

All accessible sources addressing historical ethnographical accounts of the use of wild food plants were analysed. Historical sources written by Baltic Germans and Gustav Vilbaste contained predominantly Latin names of the plants. In the few cases where Gustav Vilbaste had over-identified the species listed by Baltic Germans, the identification was critically evaluated and Vilbaste's identification was considered correct (for example *Urtica urens* L. was changed to *Urtica dioica* L., *Arctium lappa* L. to *Arctium tomentosum* Mill.). In the European context the last change may seem unreasonable, since *A. lappa* is a widely eaten species all over Europe. Nevertheless, in Estonia *A. lappa* could be found in only a few places on the coastline, while the uses originate from south Estonia, where *A. lappa* does not grow [58].

The written resources based on folklore and ethnographic collections [43–47,54,55] were critically evaluated and plant

Tab. 1 List of wild food plants used in Estonia in 1770s–1960s.

Family	Latin name	Local name	Parts used	Mode of use	Citing source	
Aceraceae	<i>Acer platanoides</i> L.	Vaher	sap, flowers, flower buds	drink (fresh and rarely fermented), snacks, infusions, for making food instead of water	[22,24,55,57]	
Alliaceae	<i>Allium oleraceum</i> L.	Metslook	leaves, shoots, bulbs	spices	[25]	
	<i>Allium schoenoprasum</i> L.	Murulauk, leemlaugud	leaves, bulbs	snacks, spices, soup	[24,48,52,55]	
	<i>Allium</i> spp.	Lauk	leaves	snacks, salad	[48]	
Araceae	<i>Allium ursinum</i> L.	Karulauk	leaves	salad, snacks	[23,48]	
	<i>Acorus calamus</i> L.	Kalmus	rhizomes*	unspecified food*, snacks	[23,55]	
Asteraceae	<i>Calla palustris</i> L.	Soovõhk	rhizomes*	cooked for food*	[28,51]	
	<i>Achillea millefolium</i> L.	Raudrohi, verihein	aerial part, flowers, stalks	infusions, additive to beer	[47,55,57]	
	<i>Antennaria dioica</i> (L.) Gaertn.	Kassikäpp	aerial part	infusions	[57]	
	<i>Anthemis tinctoria</i> L.	Rumaska	flowers	infusions	[57]	
	<i>Arctium tomentosum</i> Mill.	Kobruleht, takjas	leaves, peeled young stalks*	soup	[22,23,45]	
	<i>Artemisia absinthium</i> L.	Koirohi, pänül	aerial part	additive to beer, beer-like drinks	[27,47,48,55]	
	<i>Centaureum erythraea</i> Rafn	Maasapp, põldhumalad	aerial part	additive to beer	[22,24,47,50,52]	
	<i>Cichorium intubus</i> L.	Sigur	roots	coffee substitute	[55]	
	<i>Cirsium arvense</i> (L.) Scop. var. <i>mite</i> (Wimm. et Grab.) Lange	Ohakas, ohtja	young shoots	soup, bread ingredient	[22,23,45,51,55]	
	<i>Matricaria chamomilla</i> L.	Kummelid	flowers	infusions	[29]	
	<i>Matricaria</i> spp.	Kummel	flowers, aerial part	infusions	[57]	
	<i>Scorzonera humilis</i> L.	Mustjuur	brown dust found in flowers	snacks	[52]	
	<i>Sonchus</i> spp.	Piimohakas, ohtja	aerial part	soup, snacks	[22,29,51,55]	
	<i>Tanacetum vulgare</i> L.	Reinvars	aerial part	beer additive	[47]	
	<i>Taraxacum officinale</i> Webb	Võilill, seaõitsed	leaves, flowers, roots	salad, snacks, coffee substitute, soup*	[25,27,45,55]	
	<i>Tragopogon pratensis</i> L.	Kohv, piimhain	young stalks	snacks	[52,55]	
	<i>Tussilago farfara</i> L.	Paiseleht	leaves	soup	[28,45]	
	Berberidaceae	<i>Berberis vulgaris</i> L.	Kukerpuu, paburits	fruits, leaves	snacks, infusions, jam, spices for fermented cucumbers, additive to deserts, wine	[22,28,48,55,57]
	Betulaceae	<i>Alnus</i> spp.	Lepp	cambium, wood, catkins	snacks, for smoking meat, bread ingredient	[45,47,48,54,55]
		<i>Betula</i> spp.	Kask, kõiv	sap, leaves, catkins, cambium, bark, sawdust	drink (fresh and fermented), snacks, infusions, bread ingredient, salad, vinegar	[22,24,44,45,47,54,55,57]
Boraginaceae	<i>Anchusa officinalis</i> L.	Mesilill, imikas	nectar, young shoots*	snacks, soup*, salad*	[28,29,52]	
	<i>Pulmonaria officinalis</i> L.	Imikas, söögilill	nectar	snacks	[52,55]	
Brassicaceae	<i>Alliaria petiolata</i> (M. Bieb.) Cavara & Grande	Salukõdrik	aerial part*	unspecified food*	[22]	
	<i>Armoracia rusticana</i> P. Gaertn., B. Mey. & Scherb.	Mädarõigas, mäerõigas	roots, leaves	spices for fermented cucumber, additive to food, meat dishes	[48,55]	
	<i>Bunias orientalis</i> L.	Tõlk, rakvere raibe	young leaves, (peeled) stalks	snacks, soup	[51]	
	<i>Capsella bursa-pastoris</i> (L.) Medik.	Hiirekõrv	aerial part	infusions	[57]	
	<i>Cardamine amara</i> L.	Salat, kressid	leaves	salad	[49,52,55]	
	<i>Cardamine pratensis</i> L.	Salat, kressid	leaves	salad	[49]	
	<i>Crambe maritima</i> L.	Merekapstad	leaves*	soup*	[25]	
	<i>Sinapis arvensis</i> L.	Telg, tõlk	seeds, shoots	mustard, soup	[23,24,45,55]	
	<i>Thlaspi arvense</i> L.	Litterhein	seeds	spices for soup and blood sausage	[55]	

Tab. 1 (continued)

Family	Latin name	Local name	Parts used	Mode of use	Citing source
Cannabaceae	<i>Humulus lupulus</i> L.	Humal	fruits, young shoots	additive to beer, beer-like drinks, bread ingredient, soup*, salad*	[22,24,27,45, 47,48]
Caprifoliaceae	<i>Lonicera xylosteum</i> L.	Kukepuu, ukekuusmaa, sadakordne	fruits	snack	[22,24]
Chenopodiaceae	<i>Atriplex</i> spp.	Malts	young shoots	soup	[25,55]
	<i>Chenopodium album</i> L.	Malts, hanemalts	young shoots, seeds	soup, bread ingredient	[29,45,51, 52,55]
Cladoniaceae	<i>Viburnum opulus</i> L.	Lodjapuu, koera öidpuu	fruits	snacks, bread ingredient, jam	[24,48,55]
	<i>Cladonia</i> spp.	Valge sammal, sammal (?)	thallus	bread ingredient	[38,45,47]
Convallariaceae	<i>Maianthemum bifolium</i> (L.) F. W. Schmidt	Viinamari, orava marjad, metsviinamari	fruits	snacks	[29,52,55]
Cornaceae	<i>Cornus sanguinea</i> L.	Komppuu, kontpuu	fruits	snacks	[55]
Corylaceae	<i>Corylus avellana</i> L.	Sarapuu, pähklipuu	nuts, catkins, buds	snacks, desserts ingredient, bread ingredient, seasonal beverage	[24,27,28,45, 47,48,51,55]
Crassulaceae	<i>Jovibarba sobolifera</i> (Sims) Opiz (?)	Maarjasõnajalg	young leaves	soup	[55]
	<i>Sedum maximum</i> (L.) Suter	Tuhkkartul	radial tuber, leaves*, young shoots*	cooked for snacks, soup*, salad*	[28,52]
Cupressaceae	<i>Juniperus communis</i> L.	Kadakas	cones, twigs, wood	snacks, infusions, jam, drink, spices for food, beer, beer-like drinks, smoking meat, additive to fermented birch sap	[22,24,28,43, 47,48,54,55, 57,62]
Cyperaceae	<i>Schoenoplectus tabernaemontani</i> (C. C. Gmel.) Palla	Merekõrkjas	radial tuber	snacks	[54]
	Unidentified Cyperaceae	Villpea, sootutid, soohein	stalks	snacks	[45]
Dryopteridaceae	Dryopteridaceae (?)	Sõnajalg	leaves, roots	bread ingredient	[47,48,55]
Equisetaceae	<i>Equisetum arvense</i> L.	Kesatilgad, kitsenisad, piibusk, seatilk, savipähklid,	spring shoots, radial tuber	soup, snacks (also cooked on fire), bread ingredient	[45,51,55]
Ericaceae	<i>Arctostaphylos uva-ursi</i> (L.) Spreng.	Leesikad, siapohl	leaves, fruits	infusions, snacks	[55,57]
	<i>Calluna vulgaris</i> (L.) Hull.	Kanarbik	flowers, aerial part, seeds	infusions, bread ingredient	[45,55,57]
	<i>Empetrum nigrum</i> L.	Kukesilmad, varesemarja	fruits	snack, wine	[28,55]
	<i>Pyrola rotundifolia</i> L.	Talihaljak	leaves	infusions	[57]
	<i>Rhododendron tomentosum</i> Harmaja	Sookail, sookikas, sookaer	aerial part	additive to beer, beer-like drinks	[22,47,48,55]
	<i>Vaccinium myrtillus</i> L.	Mustikas	fruits, leaves, flowers, aerial part	snacks, jam, soup, additive to desserts, infusions	[28,46,51, 54,55]
	<i>Vaccinium oxycoccos</i> L.	Kuremari, karbala	fruits	snacks, additive to dessert and sauerkraut	[46,48,51, 54,55]
	<i>Vaccinium uliginosum</i> L.	Sinikas	fruits	snacks, wine	[29,51,54,55]
	<i>Vaccinium vitis-idaea</i> L.	Pohl, palohka, poolgas	fruits, flowers, aerial part	snacks, jam, salad, additives to other desserts, stored under water, infusions	[28,29,46,48, 51,54,55,57]
	Fabaceae	<i>Lathyrus tuberosus</i> L.	Seapähkel	radial tuber*	food, unspecified*
<i>Lotus corniculatus</i> L.		Virapool	aerial part	infusions	[57]
<i>Trifolium</i> spp.		Ristik, ristikhein, must härjapea, valge härjapea	flowers	infusions	[55,57]
<i>Vicia cracca</i> L.		Kurehernes, hiirehernes	seeds	snacks	[29,49]
Fagaceae	<i>Vicia faba</i> L.	Uba	stalks	additive to beer, for colouring	[47]
	<i>Quercus robur</i> L.	Tamm	acorn, bark, leaves	coffee substitute, spices for lacto-fermented cucumbers, bread ingredient, spices for beer-like drinks	[24,27,28,45, 55,57]
	Grossulariaceae	<i>Ribes alpinum</i> L.	Mage sõstar, imalad, mammuspuu, naestõmari	fruits	snacks

Tab. 1 (continued)

Family	Latin name	Local name	Parts used	Mode of use	Citing source
	<i>Ribes nigrum</i> L.	Sitikas, must sõstar	fruits, leaves, twigs	snacks, spices for lacto-fermented cucumber, birch sap, infusions, bread ingredient, species for beer-like drinks	[45,47,48,55, 57,62]
	<i>Ribes uva-crispa</i> L.	Kikerberi	leaves	infusions	[57]
Hippocastanaceae	<i>Aesculus hippocastanum</i> L.	Kastan	seeds	coffee substitute, jam	[28,55]
Hypericaceae	<i>Hypericum</i> spp.	Naistepuna, viinalilled, viinapunad	aerial part, flowers	infusions, spices for blood sausages, white pudding and vodka	[29,52,55,57]
Hypolepidaceae	<i>Pteridium aquilinum</i> (L.) Kuhn	Sõnajalg	rhizomes	bread ingredient	[45,48,55]
Lamiaceae	<i>Galeopsis tetrahit</i> L.	Mesililled, imikad	nectar	snacks	[29,52]
	<i>Lamium album</i> L.	Iminõges, imikas, imik, emanõges, naistenõges, miikasmaasikad	nectar, flowers, young plants	snacks, infusions, soup	[28,45,52,55]
	<i>Mentha</i> spp.	Münt, vehverments, piparmünt, põldmünt, vesimünt	aerial part, leaves, flowers	infusions, additive to food e.g. blood sausages and white pudding, species for vodka	[50,55,57]
	<i>Origanum vulgare</i> L.	Pune, vorstirohi	aerial part, leaves, flowers	infusions, spices for a variety of food, blood sausages and white pudding, additive to beer, soup	[27,28,47,50, 55,57]
	<i>Prunella vulgaris</i> L.	Metspiparmünt	aerial part	infusions	[57]
	<i>Thymus serpyllum</i> L.	Liivatee, viinapuna	aerial part, flowers, leaves	infusions, spices for food, additive to vodka	[28,50,55,57]
Linaceae	<i>Linum usitatissimum</i> L.	Lina	capsule	bread ingredient	[45]
Malvaceae	<i>Malva pusilla</i> Sm.	Kassirattad, kassinaerid	aerial part	soup*, snacks	[25,55]
Menyanthaceae	<i>Menyanthes trifoliata</i> L.	Ubaleht	aerial part	additive to beer	[24,28,48]
Myricaceae	<i>Myrica gale</i> L.	Porss	leaves, twigs	additive to beer	[24,28,47,48]
Nymphaeaceae	<i>Nymphaea candida</i> C. Presl	Vesiroos	rhizomes*	milled in food*	[28,51]
Oleaceae	<i>Syringa vulgaris</i> L.	Sirinäs	flowers	snacks for luck	[55]
Onagraceae	<i>Epilobium angustifolium</i> L.	Kaporuski	young stalks*, leaves	soup*, stew*, infusions	[27,28,57]
Orchidaceae	<i>Orchis morio</i> L.	Jänese munad	tubers*	bread ingredient*, porridge*	[25]
	<i>Platanthera bifolia</i> (L.) L. C. Rich.	Jänese munad	tubers*	bread ingredient*, porridge*	[25]
Oxalidaceae	<i>Oxalis acetosella</i> L.	Jänese hapuoblikas, kikikapsas, saksamaa oblikad, jänese kapstad	leaves, flowers	snacks, soup	[24,25,27,45, 51,54,55]
Papaveraceae	<i>Fumaria officinalis</i> L.	Kolmekõrraline hain	aerial part	infusions	[57]
	<i>Papaver somniferum</i> L.	Moonid	seeds	snacks, additive on home-baked roll	[55]
Parmeliaceae	<i>Cetraria islandica</i> (L.) Ach.	Nõmmesammal, põdrasammal, islandi sammal, liivasamblad, sammal (?)	thallus	bread ingredient, infusions	[25,38,45,47, 55,57]
Pinaceae	<i>Picea abies</i> (L.) H. Karst.	Kuusk	shoots (young), needles, cambium, cones, resin	snacks, smoking of meat	[45,48,54,55]
	<i>Pinus sylvestris</i> L.	Pedaja, mänd, pettäi	shoots (young), cambium, cones, bark	snacks, bread ingredient, smoking of meat	[45,47,48,55]
Plantaginaceae	<i>Plantago major</i> L.	Teeleht	leaves	infusions, soup, salad*	[22,27–29,48, 50,57]
Poaceae	<i>Bromus secalinus</i> L.	Lusted, kaer	seeds	distilled vodka, beer ingredient	[55]
	<i>Phragmites australis</i> (Cav.) Trin. ex Steud.	Roog	roots	snacks	[48,54]
	Poaceae	Aganad, kõrred	soft part of stalk, chaff	snacks, bread ingredient	[45,47,48]
	<i>Secale cereale</i> L.	Rukis	young crops	infusions	[57]
Polygonaceae	<i>Polygonum amphibium</i> f. <i>terrestre</i> (Leers) S. F. Blake	Seavinnal	roots	snacks	[55]

Tab. 1 (continued)

Family	Latin name	Local name	Parts used	Mode of use	Citing source
	<i>Rumex acetosa</i> L.	Oblikas, hapuoblikas	leaves	snacks, soup, pie	[23,25,29,45,51,54,55]
Polypodiaceae	<i>Rumex acetosella</i> L.	Hapuoblikas	leaves, young stalks	snacks	[24,52]
	<i>Polypodium vulgare</i> L.	Magusjuur, suhkrupuu, lagrits	rhizomes	snacks	[55]
Primulaceae	<i>Lysimachia nummularia</i> L.	Trudamorda	aerial part	infusions	[57]
	<i>Lysimachia vulgaris</i> L.	Metsvits	medulla*	snacks*	[27,50]
	<i>Primula veris</i> L.	Nurmenukk, käekaatsed	flowers, leaves, steams, pistil, aerial part, nectar, flower stalks	snacks, infusions, snacks for luck, wine*, beer-like drinks*	[24,27,49,54,55,57]
Ranunculaceae	<i>Caltha palustris</i> L.	Varsakabi, konnakapsad	aerial part, buds*	bread ingredient, substitute for capers*	[24,45,47,49]
	<i>Ranunculus ficaria</i> L.	Kanakoole	young shoots, tubers	salad (tubers were used only after soaking in salted water)	[23,50,51]
Rosaceae	<i>Thalictrum aquilegifolium</i> L.	Ängelhein, kirnputk, koerkuseputk, koerputk	flowers	infusions	[57]
	<i>Alchemilla vulgaris</i> auct. (coll.)	Krooklehed, kortsleht	leaves	infusions	[55,57]
	<i>Crataegus</i> spp.	Leivamari, viirpuu, leivapuu	fruits	snacks, bread ingredient	[48,55]
	<i>Filipendula ulmaria</i> (L.) Maxim.	Angervaks, viinarohi	flowers, aerial part	infusions, spices for vodka	[52,55,57]
	<i>Filipendula vulgaris</i> Moench	Angerpist, viinarohi	flowers, aerial part, radial tuber*	infusions, bread ingredient*, spices for vodka	[28,49,55,57]
	<i>Fragaria vesca</i> L.	Maasikas, metsmaasikas	fruits, leaves, flowers, aerial part	snacks, jam, infusions, additive to dessert	[24,27,29,46,51,54,55,57]
	<i>Fragaria viridis</i> A. Duch.	Muulukas, mullikmaasikad	fruits	snacks, jam, additive to dessert	[49,51,55]
	<i>Geum rivale</i> L.	Mesikupp, karukellad, ärjamürakad, härjapea, surnu sukapael	flowers, nectar, roots*	snacks, infusions, spices for food*	[24,52,55,57]
	<i>Geum urbanum</i> L.	Maamõõl	young shoots*, roots	food*, spices*	[24,27]
	<i>Malus domestica</i> Borkh.	Õunapuu	fruits, leaves, wood	snacks, wine, vinegar, infusions, additive to sauerkraut, smoking of meat	[48,54,55,57]
<i>Malus sylvestris</i> Mill.	Metsõunapuu	fruits	snacks, wine	[24,29,48,51]	
<i>Potentilla erecta</i> (L.) Raeusch	Tedre madar, tedremaran	rhizomes	cooked for food, additive to vodka	[29,45,48]	
<i>Prunus cerasus</i> L.	Kirsipuu	fruits, leaves, flowers	snacks, infusions, spices for fermenting cucumbers	[55,57]	
<i>Prunus domestica</i> L. subsp. <i>insititia</i>	Kreegipuu	leaves	infusions	[57]	
<i>Prunus domestica</i> L.	Ploomipuu	flowers	infusions	[57]	
<i>Prunus padus</i> L.	Toomingas	fruits, leaves, flowers	snacks, spices for fermenting cucumbers, snacks for luck	[24,46,51,54,55]	
<i>Rosa</i> spp.	Kibuvits, orjavits, roos	fruits, flowers	snacks, infusions, jam, kissel, bread ingredient, coffee, dessert	[24,48,54,55,57]	
<i>Rubus caesius</i> L.	Põldmurakas, põldmari	fruits	snacks, wine, jam	[28,49,52,54,55]	
<i>Rubus chamaemorus</i> L.	Murakas, käbalad	fruits, leaves, flowers	snacks, infusions, jam	[28,29,51,54,55,57]	
<i>Rubus idaeus</i> L.	Vaarikas, vabarn	fruits, leaves, twigs	snacks, infusions, additive to fermented cucumbers, jam, coffee substitute, wine	[24,27,51,54,55,57]	
<i>Rubus saxatilis</i> L.	Lillakas	fruits	snacks, wine	[51,55]	
<i>Sorbus aucuparia</i> L.	Pihlakas	fruits, flowers, sap	snacks, jam, wine, infusions, bread ingredient, kvass	[27,44,46–48,51,54,55]	
<i>Sorbus intermedia</i> (Ehrh.) Pers.	Leivamari, pooppuu	fruits	snacks, bread ingredient	[48,55]	
<i>Sorbus rupicola</i> Hedl.	Kirsi-pooppuu	fruits	bread ingredient	[55]	

Tab. 1 (continued)

Family	Latin name	Local name	Parts used	Mode of use	Citing source
Salicaceae	<i>Populus tremula</i> L.	Haab	wood, sawdust	smoking of meat, bread ingredient, vinegar	[47,48,55]
	<i>Salix</i> spp.	Paju	leaves	bread ingredient	[45]
Scrophulariaceae	<i>Pinguicula vulgaris</i> L.	Võipätakas	aerial part	additive for souring the milk	[27,28,50]
	<i>Rhinanthus</i> spp.	Robirohi, luutsihain	nectar	snacks	[50,52]
	<i>Verbascum</i> spp.	Üheksavägine	flowers	infusions	[57]
Solanaceae	<i>Solanum tuberosum</i> L.	Kartul	aerial part	soup	[54,55]
Tiliaceae	<i>Tilia</i> spp.	Pärn, niin, pähnappu	flowers, buds, sap, twigs and flower buds	infusions, snacks	[44,55,57]
Typhaceae	<i>Typha</i> spp.	Hunditõlv, hundipurik, hundikurk	rhizomes, young shoots*	snacks, salad*, stew*	[24,28,45,48]
Umbelliferae	<i>Aegopodium podagraria</i> L.	Naat, varesnaat	young leaves, shoots and stalks	soup, bread ingredient in spring time	[22,24,25,45,51,54]
	<i>Angelica sylvestris</i> L.	Pütski, heinputk, söögiputk	young shoots, peeled stalks, aerial part	soup, snacks, infusions	[45,49,51,54,55,57]
	<i>Anthriscus sylvestris</i> (L.) Hoffm.	Pütski, penipütsk	young shoots, peeled stalks	soup, snacks	[45,49,51]
	<i>Carum carvi</i> L.	Köömen, köömlid	seeds, leaves, stems	spices for variety of food, bread, blood sausages and white pudding, vodka, sauerkraut, fermented cucumbers, birch sap and other preserves, snacks, soup, infusions, additive to beer-like drinks and cottage cheese	[22,23,25,29,47,48,51,55,57,62]
	<i>Heracleum sphondylium</i> L. (?)	Karuputk, natid	young shoots, peeled stalks	soup, snacks	[22–24,27,48]
	<i>Peucedanum palustre</i> (L.) Moench	Soo-ingver, ingver	roots	spices for home-made Baltic sprat	[49]
	<i>Pimpinella anisum</i> L.	Ingver, maaingver	roots	spices for food	[55]
Urticaceae	<i>Urtica dioica</i> L.	Nõges, kõrvenõges, raudnõges	leaves, aerial part (young), stalks, shoots, roots	soup, infusions, bread ingredient, for smoking meat	[22,23,25,26,45,48,51,54,55,57]
Valerianaceae	<i>Valeriana officinalis</i> L.	Palderjan	aerial part, flowers, roots	infusions	[57]
Violaceae	<i>Viola odorata</i> L.	Kannike	flowers	dessert, spices for syrup and vinegar*	[28,55]

(?) – name did not have enough details for specific identification. * Data of uncertain ethnic origin.

names identified through using local names [52]. Identification changes were made where necessary, relying on the work of Sõukand and Kalle [55]. For example identifications followed by Moora [45]: *Dryopteris* spp. to *Pteridium aquilinum* (L.) Kuhn. The previously unidentified species *Sinapis arvensis* L. was also added to the list based on its local name (“tõlk”). Based on the same principles two plants identified in sources relying on folklore were excluded: *Angelica archangelica* L. and *Conium maculatum* L. The latter was named kaljaputk, indicating its use for making kvass. Regardless of the fact that some nations do use deadly poisonous plants for food after certain preparations (e.g. [59]), the text claiming the use of kaljaputk did not contain any other reliable information, nor a description of its preparation allowing for its identification as *C. maculatum*.

If the local plant name listed in the sources did not allow for identification on the species level, a taxon was identified as a genus. The list of all species that could potentially be eaten within the particular genus is provided in Tab. 2. Nevertheless, two taxa listed in folklore and written sources did not allow for identification below the family (Cyperaceae and Poaceae), and

in both families the softer part of the stalks of several species were eaten as snacks.

The texts in which plant identification credibility (discussed by Łuczaj [60]) was very low or the taxon was impossible to detect, were left aside.

The reliability and completeness of the presented data

Compared to Estonian serfs, the food selection of Baltic German landlords was much more diverse and contained many wild spices, used to make salads and soups; as well as numerous wild berries used to make juice, wine, salads and jams. Therefore, Baltic Germans were trying to educate local peasants through books and personal advice [22,25].

Memories of the earliest folklore texts reach back to the mid-19th century. Therefore they do not contain the specific species found in Hupel's and Luce's publications or later interpretations in Vilbaste's study [51] (see uses marked with “*” in Tab. 1). The original publications are written in a manner that does not enable us to understand where, or, more particularly, who used to make salad from the leaves of *Taraxacum officinale*

Tab. 2 The species potentially named in texts where the taxa could be identified to the genus only. Species are presented in the order of assumed use frequency.

Genera	Species potentially used
<i>Allium</i> spp.	<i>A. vineale</i> L., <i>A. schoenoprasum</i> L., <i>A. scorodoprasum</i> L., <i>A. oleraceum</i> L., <i>A. ursinum</i> L.
<i>Alnus</i> spp.	<i>A. glutinosa</i> (L.) Gaertn., <i>A. incana</i> (L.) Moench
<i>Atriplex</i> spp.	<i>A. hortensis</i> L., <i>A. patula</i> L.
<i>Betula</i> spp.	<i>B. pendula</i> Roth, <i>B. pubescens</i> Ehrh.
<i>Cladonia</i> spp.	<i>C. stellaris</i> (Opiz) Pouzar & Vězda, <i>C. stygia</i> (Fr.) Ruoss, <i>C. mitis</i> Sandst., <i>C. arbuscula</i> (Wallr.) Flot.
<i>Crataegus</i> spp.	<i>C. palmstruchii</i> Lindm., <i>C. rhipidophylla</i> Gand., <i>C. sanguinea</i> Pall.
<i>Hypericum</i> spp.	<i>H. perforatum</i> L., <i>H. maculatum</i> Crantz
<i>Matricaria</i> spp.	<i>M. chamomilla</i> L., <i>M. recutita</i> L.
<i>Mentha</i> spp.	<i>M. aquatica</i> L., <i>M. × piperita</i> , <i>M. crispa</i> L., <i>M. arvensis</i> L.
<i>Primula</i> spp.	<i>P. veris</i> L., <i>P. farinosa</i> L., <i>P. elatior</i> (L.) Hill
<i>Rhinanthus</i> spp.	<i>R. angustifolius</i> C. C. Gmel. s.l., <i>R. minor</i> L.
<i>Rosa</i> spp.	<i>R. rugosa</i> Thunb., <i>R. majalis</i> Herrm., <i>R. vosagiaca</i> N. H. F. Desp., <i>R. subcanina</i> (H. Christ) Dalla Torre et Sarnt., <i>R. mollis</i> Sm.
<i>Salix</i> spp.	<i>S. myrsinifolia</i> Salisb., <i>S. aurita</i> L., <i>S. cinerea</i> L., <i>S. phyllicifolia</i> L., <i>S. triandra</i> L.
<i>Sonchus</i> spp.	<i>S. arvensis</i> L., <i>S. oleraceus</i> L.
<i>Tilia</i> spp.	<i>T. cordata</i> Mill., <i>T. platyphyllos</i> Scop.
<i>Trifolium</i> spp.	<i>T. repens</i> L., <i>T. pratense</i> L., <i>T. montanum</i> L., <i>T. aureum</i> Pollich, <i>T. spadiceum</i> L.
<i>Typha</i> spp.	<i>T. angustifolia</i> L., <i>T. latifolia</i> L.
<i>Verbascum</i> spp.	<i>V. nigrum</i> L., <i>V. thapsus</i> L.

Webb, soup of leaves of *Crambe maritima* L. or peeled stems of *Arctium tomentosum* Mill.; who used to make various food from the rhizomes of *Nymphaea candida* C. Presl, *Calla palustris* L., *Acorus calamus* L., the tubers of Orchidaceae and *Lathyrus tuberosus* L. or the aerial parts of *Alliaria petiolata* (M. Bieb.) Cavara et Grande; or who used the buds of *Caltha palustris* L. as a substitute for capers, etc. The actual use of all those species by Estonian peasants cannot be confirmed, but cannot be disproved either. These species could have been used by local Baltic Germans, Swedes, or Russians, or on the territory of Livonia.

Although the majority of the cited authors use folkloristic and ethnographic sources, the whole existing archival data on the use of wild food plants in Estonia has never been digitized nor thoroughly systematized. Until this is done, it is impossible to state if any more taxa were historically used.

Results and discussion

During the research period, altogether 149 vascular plant taxa (approx. 6.6 % of native and naturalized flora of Estonia) and 2 lichens were consumed (Tab. 1). If we exclude from the calculation those 19 species used for making infusions (recreational teas) only, there will be 130 taxa left, covering almost 5.8% of the Estonian vascular flora. All the taxa belong to 123 genera from 56 families [largest Rosaceae (22 taxa) and Asteraceae (16 taxa)]. The list includes 18 tree taxa, 15 shrubs, 11 subshrubs and one vine. Among the herbaceous plants 76 are perennials, 6 biennials and 5 annuals.

Most of the taxa were used in a variety of ways, utilizing various parts of the plant, only a few plants were used for one specific purpose (usually infusions or snacks only). The species that were used for infusions only had popularly recognized medicinal properties, and snacks were occasionally eaten raw. Among the most diversely consumed plants we can single out *Carum carvi* L., *Urtica dioica* L., and a variety of wild berries

(*Vaccinium vitis-idaea* L., *Vaccinium myrtillus* L., etc) and fruits (*Sorbus aucuparia* L., *Rosa* spp., etc).

Snacks

Seasonal snacks form the largest group of wild plants used, covering almost half of all the species (72). Most of the snacks (fruits, nectar, leaves, buds, cambium, stalks, etc.) were eaten in outdoor conditions without prior processing, while some were cooked [as tubers of *Sedum maximum* (L.) Suter and *Equisetum arvense* L.], frozen (such as fruits of *Viburnum opulus* L., *Malus sylvestris* Mill. and *Sorbus aucuparia* L.), or dried (*Corylus avellana* L. and *Vaccinium myrtillus* L.). While in earlier ethnobotanical research snacks were associated predominantly with children [60,61], in 19th century Estonia snacks were eaten by both children and adults, although more recently snacks tended to be consumed by children. Still, specific plants have been used as children's snacks only, such as the rhizomes of *Polypodium vulgare* L. (also used as medicine instead of *Glycyrrhiza glabra* L.), the dark “coffee” dust in the flowers of *Scorzonera humilis* L., a species used for sucking nectar, and a few others. Sweet snacks with sugar added were rather uncommon among peasants until the first decades of the 20th century due to the lack of sugar, but after that many berries were eaten with sugar and milk (later cream) added. Some other sweets were also made of flowers as candy, for example of *Viola odorata* L. and *Rosa* spp.

Beverages

Beverages made of wild plants are the second largest group of wild food consumed. As many as 54 vascular plants and one lichen were used to make infusions [57]. In the time of scarcity, the infusion made of well-tasting plants was especially appreciated as it gave better taste to the food. Twelve taxa were used for making or flavouring beer and eight for beer-like beverages. Several parts (acorns, roots, twigs) of six species were used to make coffee. Also saps of different trees were used (fresh or fermented), the most widespread being saps of *Betula* spp. and

Acer platanoides L. (see also [62]). Fruits of only eight taxa were used for making wine; this practice started only at the beginning of the 20th century, when sugar became more accessible.

Bread ingredients

In the 18th and the first half of the 19th century the main foods for peasants were bread and other products made of flour [47]. Thus every crop failure caused by bad weather brought along large-scale famine [63]. This explains why a large group of vascular plants (30) and the thallus of two lichens were used as bread ingredients. A vast variety of plant parts was used for filling bread, including (dried) bulbs, leaves, shoots, cambium and bark. Some plants, especially powdered roots and young shoots, were added to the bread to “prolong” the flour; laced bread was called “näljaleib” (hunger-bread) in times of famine, and “hädaleib” (need-bread) before the new crop. Some of the ingredients that had pleasant taste were used also for flavouring bread in better times, for example *Sorbus* spp. fruits, also *Carum carvi* fruits were used, along with providing better taste to ensure longer preservation of the bread.

During the second half of the 19th century, when potato became widespread, the nutritional situation of peasants became better. The need for wild plants as bread ingredients gradually diminished, until it almost disappeared by the 1960s, partly also because, due to socio-economic changes, bread was then made at home by only a very few people. Still, few wild ingredients were later also used in making home-made rolls.

Soups and gruel

Greens (*U. dioica*, *Rumex* spp. and *Cirsium* spp., being most mentioned in folklore among them) that popped up after the snowmelt, were used for making a variety of dishes such as soup and porridge during food shortages. This happened almost every year to a greater or lesser extent, and the quantity of the added greens depended on the stocks of flour and grain available, but also on regional and household food habits. Altogether, 26 species were used in the form of soup, which argues against the statement of Baltic German authors that the monotonous diet of Estonians contained a very limited amount of green vegetables [22,25]. Moreover, some sources from the 18th century complain that local peasants eat too many greens in the spring famines and die of it [63].

Spices

Altogether 18 taxa have been used for seasoning different foods, the majority of them very commonly. Eight taxa were used as ingredients for lacto-fermented cucumbers (mostly leaves, but also fruits, twigs and roots); three taxa were used for seasoning sauerkraut and another three for flavouring soured birch sap. Some of the herbs used for infusions were also used to season vodka (six taxa) and blood sausages (four taxa). Eight taxa were used as additives to beer. Seven taxa were used to smoke meat or fish; mostly wood, but also leaves and cones. Along with the seasoning purposes, spices were intended to improve the storing properties of the foods they were used in, for example a handful of *Carum carvi* in bread batter, a few segments of *Armoracia rusticana* root in cucumber preserves, a few inflorescences of *Rhododendron tomentosum* Harmaja. for a bucket of beer, etc.

Fruits and seeds

Of the fleshy fruits, 14 were fruits of wild shrubs and semi-shrubs and 11 were fruits of wild trees, all of them were

consumed as snacks, but some were also used for making food, or as spices, and/or preserved for the winter in different ways. Until the end of 19th century the preservation of wild fruits was rather rare and mostly carried out in the form of drying or freezing, also under-water storage, and the fruits were used predominantly for healing purposes. Since the beginning of the 20th century, the wider making of jams (for food) began, reaching its peak in the 1970s–1980s.

Although the majority of the seeds and dry fruits (7 species) were used as snacks only, there were also a few used for making food (nuts of *Corylus avellana* L. and acorns of *Quercus robur* L.). Also, the caryopses (grains) of *Bromus secalinus* L. were used to make vodka and beer; and seeds of *Sinapis arvensis* L. were used as the main component of mustard.

Salads

For many species, the green parts of the vegetable such as leaves and stalks were consumed. However, the use of wild green vegetables for making salad was rather limited, only 11 species were consumed. The use of salad seems to be a clear imitation of the landlords' food-habits. For example two local species *Cardamine amara* L. and *Cardamine pratensis* L. were named after *Lepidium* spp., cultivated and consumed in manors [49]. The use of the other greens for salad is of quite late origin (beginning of 20th century).

Underground parts

Underground parts of the plants were consumed rather rarely, being predominantly either famine food or snacks; altogether 24 taxa were used. Of them, 7 species with underground parts used were of uncertain ethnic origin (marked with “*” in Tab. 1; see “The reliability and completeness of the presented data” section for details). Underground parts were mostly used as bread ingredients, but also as snacks [*Equisetum arvense* L., *Phragmites australis* (Cav.) Trin. ex Steud., *Polypodium vulgare* L.] and cooked food [*Potentilla erecta* (L.) Raeusch, *Sagittaria sagittifolia* L.]. Roots of some taxa were also used as spices (*Armoracia rusticana* Gaertn. et al.), or for making infusions (*Valeriana officinalis* L.) or coffee (*Taraxacum officinale*).

Alien plants, literature and education

While the local habitants had a long time to acquire knowledge of the native plants, the quick introduction of alien plants into the diet of Estonians came about mostly through the popularizing literature. At the end of the 19th century, general literacy in Estonia was the highest in all of the Russian Empire, being almost 90% at the end of the 19th century [64]. The first alien taxon of cultivated ornamental plants introduced for food was *Caragana arborescens* Lam. [65], and although there are no records of its use during the period of the research, probably due to its very early publication date, its seeds and flowers were eaten later (unpublished fieldwork results). Nevertheless, the use of the conkers of *Aesculus hippocastanum* L. is clearly of literature origin, as its use for making coffee was widely propagated at the beginning of the 20th century (for example see [66,67]).

The use of native plants was also acquired through the literature, like the use of the thallus of *Cetraria islandica* (L.) Ach. as a bread ingredient from [25] and the teachings of local Baltic Germans. Estonian pioneer doctor and the author of national epic Friedrich Reinhold Kreutzwald (1803–1882) reports that flour made of soaked and dried thallus saved town citizens of Võru from famine in the 1830s, as the town's mayor supported

its use for making bread [38]. Another lichen taxon, *Cladonia* spp., was also used instead of *C. islandica*, as people often did not differentiate them on the name level [68].

Nevertheless, most of the teachings communicated through the literature were not accepted. For example the very popular first herbal written in Estonian by Baltic German pastor Otto August Jannau (1800–1865) teaches the use of *Glyceria* spp. for making manna porridge [69], but despite the fact that this plant was widely eaten in parts of central Europe [70], Estonian peasants did not adopt its use, probably because they already had potatoes and severe famines were only history at the time the book was published.

The practice of making of jam from wild berries most probably first came from the book by local schoolteacher and pomologist Jaan Spuhl-Rotalia (1859–1916), who taught the use of almost all wild berries growing in Estonia [66]. Also, the making of jams was taught on numerous cooking courses conducted in the first half of the 20th century all over Estonia.

Future discussion

It is difficult to compare the use of wild food plants in Estonia with that of neighbouring regions (Latvia, Finland, Russia), as they lack detailed ethnographic reviews. Still, large proportions of Rosaceae and Asteraceae make Estonia similar to other eastern European countries, e.g. Poland and Slovakia [21,61]. The most important detail needing attention is the low use of salads made of fresh leafy wild vegetables. That may be caused by their short-term availability in Estonia, but also by the need for hot food due to climatic conditions and the need for easier access to nutrients. In general, the large proportion of use as snacks among wild edible plants indicates a relatively good knowledge of the plants and their edibility among the population of Estonia in the past. Notable consumption of wild berries up to near-modern times reflects the fact that they are better appreciated than green vegetables.

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References

1. Turner NJ, Luczaj ŁJ, Miglioni P, Pieroni A, Dreon AL, Sacchetti LE, et al. Edible and tended wild plants, traditional ecological knowledge and agroecology. *Cr Rev Plant Sci*. 2011;30(1–2):198–225. <http://dx.doi.org/10.1080/07352689.2011.554492>
2. Redzić S. Use of wild and semi-wild edible plants in nutrition and survival of people in 1430 days of siege of Sarajevo during the war in Bosnia and Herzegovina (1992–1995). *Coll Antropol*. 2010;34(2):551–570.
3. Pieroni A, Nebel S, Quave C, Münz H, Heinrich M. Ethnopharmacology of liakra: traditional weedy vegetables of the Arbëreshë of the Vulture area in southern Italy. *J Ethnopharmacol*. 2002;81(2):165–185. [http://dx.doi.org/10.1016/S0378-8741\(02\)00052-1](http://dx.doi.org/10.1016/S0378-8741(02)00052-1)
4. Guarrera PM. Food medicine and minor nourishment in the folk traditions of Central Italy (Marche, Abruzzo and Latium). *Fitoterapia*. 2003;74(6):515–544. [http://dx.doi.org/10.1016/S0367-326X\(03\)00122-9](http://dx.doi.org/10.1016/S0367-326X(03)00122-9)
5. Tardío J, Pascual H, Morales R. Wild food plants traditionally used in the province of Madrid, central Spain. *Econ Bot*. 2005;59(2):122–136. [http://dx.doi.org/10.1663/0013-0001\(2005\)059\[0122:WFPTUI\]2.0.CO;2](http://dx.doi.org/10.1663/0013-0001(2005)059[0122:WFPTUI]2.0.CO;2)
6. Pieroni A, Nebel S, Santoro RE, Heinrich M. Food for two seasons: culinary uses of non-cultivated local vegetables and mushrooms in a south Italian village. *Int J Food Sci Nutr*. 2005;56(4):245–272. <http://dx.doi.org/10.1080/09637480500146564>
7. Rivera D, Obon C, Inocencio C, Heinrich M, Verde A, Fajardo J, et al. The ethnobotanical study of local Mediterranean food plants as medicinal resources in Southern Spain. *J Physiol Pharmacol*. 2005;56(1 suppl):97–114.
8. Tardío J, Pardo-De-Santayana M, Morales R. Ethnobotanical review of wild edible plants in Spain. *Bot J Linn Soc*. 2006;152(1):27–71. <http://dx.doi.org/10.1111/j.1095-8339.2006.00549.x>
9. Guarrera P, Salerno G, Caneva G. Food, flavouring and feed plant traditions in the Tyrrhenian sector of Basilicata, Italy. *J Ethnobiol Ethnomed*. 2006;2(1):37. <http://dx.doi.org/10.1186/1746-4269-2-37>
10. Pardo-de-Santayana M, Tardío J, Blanco E, Carvalho A, Lastra J, San Miguel E, et al. Traditional knowledge of wild edible plants used in the northwest of the Iberian Peninsula (Spain and Portugal): a comparative study. *J Ethnobiol Ethnomed*. 2007;3(1):27. <http://dx.doi.org/10.1186/1746-4269-3-27>
11. Leonti M, Nebel S, Rivera D, Heinrich M. Wild gathered food plants in the European Mediterranean: a comparative analysis. *Econ Bot*. 2006;60(2):130–142. [http://dx.doi.org/10.1663/0013-0001\(2006\)60\[130:WGFPIIT\]2.0.CO;2](http://dx.doi.org/10.1663/0013-0001(2006)60[130:WGFPIIT]2.0.CO;2)
12. Parada M, Carrió E, Vallès J. Ethnobotany of food plants in the Alt Emporda region (Catalonia, Iberian Peninsula). *J Appl Bot Food Qual*. 2011;84(1):11–25.
13. Menendez-Baceta G, Aceituno-Mata L, Tardío J, Reyes-García V, Pardo-de-Santayana M. Wild edible plants traditionally gathered in Gorbeialdea (Biscay, Basque Country). *Genet Resour Crop Evol*. 2011;59(7):1329–1347. <http://dx.doi.org/10.1007/s10722-011-9760-z>
14. Svanberg I, Nelson MC. Bone meal porridge, lichen soup, or mushroom bread: acceptance or rejection of food propaganda 1867–1868. In: Häkkinen A, editor. *Just a sack of potatoes? Crisis experiences in European societies, past and present*. Helsinki: Societas Historica Finlandiae; 1992. p. 119–147.
15. Svanberg I. The use of wild plants in the Faroe Islands 1590–1990: a contribution to Scandinavian ethnobotany. *Swedish Linnean Society*. 1998;1996–1997:81–130.
16. Svanberg I. *Folklig botanik*. Stockholm: Dialogos; 2011.
17. Redzić S. Wild edible plants and their traditional use in the human nutrition in Bosnia-Herzegovina. *Ecol Food Nutr*. 2006;45(3):189–232. <http://dx.doi.org/10.1080/03670240600648963>
18. Pieroni A. Local plant resources in the ethnobotany of Theth, a village in the Northern Albanian Alps. *Genet Resour Crop Evol*. 2008;55(8):1197–1214. <http://dx.doi.org/10.1007/s10722-008-9320-3>
19. Łuczaj Ł, Kujawska M. Botanists and their childhood memories: an underutilized expert source in ethnobotanical research. *Bot J Linn Soc*. 2012;168(3):334–343. <http://dx.doi.org/10.1111/j.1095-8339.2011.01205.x>
20. Łuczaj Ł. Changes in the utilization of wild green vegetables in Poland since the 19th century: a comparison of four ethnobotanical surveys. *J Ethnopharmacol*. 2010;128(2):395–404. <http://dx.doi.org/10.1016/j.jep.2010.01.038>
21. Łuczaj Ł, Szymański WM. Wild vascular plants gathered for consumption in the Polish countryside: a review. *J Ethnobiol Ethnomed*. 2007;3(1):17. <http://dx.doi.org/10.1186/1746-4269-3-17>
22. Hupel AW. *Topographische Nachrichten von Lief- und Ebstland: Nebst*

- vollständigen Register über alle drey Bände. Riga: Hartknoch; 1777. (vol 2).
23. Hupel AW. Die gegenwärtige Verfassung der Rigischen und der Revalschen Statthalterschaft: Zur Ergänzung der topographischen Nachrichten von Lief- und Ehstland. Riga: Hartknoch; 1789.
 24. von Luce JWL. Topographische nachrichten von der insel Oesel, in medicinischer und ökonomischer hinsicht. Riga: W. F. Häcker; 1823.
 25. von Luce JWL. Nou ja abbi, kui waesus ja nälg käe on. Riga: J. H. Gressel; 1818.
 26. Petri JC. Ehstland und die Ehsten, oder historisch-geographisch-statistisches Gemälde von Ehstland: Ein Seitenstück zu Merkel über die Letten. Gotha: Ettingerschen Buchhandlung; 1802. (vol 1).
 27. Friebe WC. Oekonomisch-technische flora für Liefland, Ehstland und Kurland. Riga: Hartmann; 1805.
 28. Wiedemann FJ, Weber E. Beschreibung der phanerogamischen Gewächse Esth-, Liv- und Curlands mit möglichst genauer Angabe der Fundorte und der geographischen Verbreitung nebst Andeutung über den Gebrauch in medicinischer, technischer und öconomischer Beziehung. Reval: Franz Kluge; 1852.
 29. Rosenplänter JH. Õppetuse katse ma Rohtudest ja pudest, mis J. H. Rosenplänter kirjutanud [Manuscript]. Tartu: Estonian Literary Museum; 1831.
 30. Valk U. Eesti Sood. Tallinn: Valgus; 1988.
 31. Paal J. Rare and threatened plant communities of Estonia. Biodivers Conserv. 1998;7(8):1027–1049. <http://dx.doi.org/10.1023/A:1008857014648>
 32. Peterson K. Nature conservation in Estonia. Tallinn: Huma; 1994.
 33. Laasimer L. Eesti NSV taimkate. Tallinn: Valgus; 1965.
 34. Kukk T. Eesti taimestik. Tallinn: Estonian Academy Publishers; 1999.
 35. Ööpik M, Kukk T, Kull K, Kull T. The importance of human mediation in species establishment: analysis of the alien flora of Estonia. Boreal Env Res. 2008;13:53–67.
 36. Wikipedia, the free encyclopedia [Internet]. Estonia. 2012 [cited 2012 Aug 21]; Available from: <http://en.wikipedia.org/wiki/Estonia>
 37. Kalle R, Sõukand R. Collectors of Estonian folk botanical knowledge. BJES. 2011;1:213–229.
 38. Kreuzwald FR. Leivast ja leiva-jätkest. In: Tarto- ja Wõrroma kalender ehk Täht-ramat 1842 ajastaja päle, perran meie Issanda Jesusse Kristusse sündimist. Tartu: Schünmann; 1841. p. 42–51.
 39. Manninen I, Linnus F. Söögid, joogid, maitsetaimed. Söögikombed. Rahvateaduslik küsimuskava. Tartu: Estonian National Museum; 1937. (Küsimusleht; vol 10).
 40. Tampere H. Mahl. Tartu: Estonian National Museum; 1934. (Küsimusleht; vol 5).
 41. Sion V. Seene-, marja-, pähkli- ja muu taimetoidu korjamisest. Tartu: Estonian National Museum; 1947. (Küsimusleht; vol 43).
 42. Viidalepp R. Juhiseid rahvaluulekogujatele: mida ja kuidas koguda. Tartu: Estonian National Museum; 1936. (ERA Küsimuskava; vol 3).
 43. Moora A. Kuidas vanasti kadakamarju kasutati. Eesti Loodus. 1984;6:378–380.
 44. Moora A. Mida vanasti kasemahlast tehti. Eesti Loodus. 1982;5:298–300.
 45. Moora A. Mida vanasti loodusest leivakõrvaseks korjati. Eesti Loodus. 1981;8:489–497.
 46. Moora A. Marjad rahvatoidus. Eesti Loodus. 1980;8:588–592.
 47. Moora A. Eesti talurahva vanem toit. 2nd ed. Tartu: Greif; 2007.
 48. Kalle R, Sõukand R. Ajalooline ülevaade eestlaste looduslikest toidu- ja ravimtaimedest. In: Kusmin T, Meikar T, editors. Metsa kõrvalkasutus Eestis. Tartu: Estonian Society of Foresters; 2011. p. 29–44. (Akadeemilise Metsaseltsi Toimetised; vol 25).
 49. Vilberg G. Meie kodumaa taimi rahva käsitusel. Tartu: Loodusevaatleja; 1934. (vol 1).
 50. Vilberg G. Meie kodumaa taimi rahva käsitusel. Tartu: Loodusevaatleja; 1935. (vol 2).
 51. Vilbaste G. Söödavaid taimi [Manuscript]. Tartu: Estonian Literary Museum; 1950.
 52. Vilbaste G. Eesti taimenimetused. Tallinn: Estonian Academy of Sciences; 1993. (Emakeele Seltsi Toimetised; vol 20).
 53. Kalle R, Sõukand R. Gustav Vilbaste (1885–1967) and ethnobotany in Estonia. Pioneers in European ethnobiology. In: Svanberg I, Łuczaj Ł, editors. A schoolteacher with a mission: preserving disappearing plant names. Uppsala: Royal Gustavus Adolphus Academy. In press.
 54. Loorits O. Lugemispalu metsaelust ja jahindusest. 2nd ed. Tartu: Estonian Literary Museum; 2004. (Endis-Eesti Elu-Olu; vol 2).
 55. Sõukand R, Kalle R. HERBA: historistlik Eesti rahvameditsiini botaaniline andmebaas [Internet]. 2008 [cited 2012 Aug 21]; Available from: <http://herba.folklore.ee>
 56. Sõukand R, Kalle R. Change in medical plant use in Estonian ethnomedicine: a historical comparison between 1888 and 1994. J Ethnopharmacol. 2011;135(2):251–260. <http://dx.doi.org/10.1016/j.jep.2011.02.030>
 57. Sõukand R, Kalle R. The use of teetaimed in Estonia, 1880s–1990s. Appetite. 2012;59(2):523–530. <http://dx.doi.org/10.1016/j.appet.2012.06.017>
 58. Kukk T, Kull T, editors. Eesti taimede levikuatlas. Tartu: Estonian University of Life Sciences; 2005.
 59. Kang Y, Łuczaj ŁJ, Ye S. The highly toxic *Aconitum carmichaelii* Debeaux as a root vegetable in the Qinling Mountains (Shaanxi, China). Genet Resour Crop Evol. 2012;59(7):1569–1575. <http://dx.doi.org/10.1007/s10722-012-9853-3>
 60. Łuczaj ŁJ. Plant identification credibility in ethnobotany: a closer look at Polish ethnographic studies. J Ethnobiol Ethnomed. 2010;6(1):36. <http://dx.doi.org/10.1186/1746-4269-6-36>
 61. Łuczaj Ł. Ethnobotanical review of wild edible plants of Slovakia. Acta Soc Bot Pol. 2012;81(4):245–255. <http://dx.doi.org/10.5586/asbp.2012.030>
 62. Svanberg I, Sõukand R, Łuczaj Ł, Kalle R, Zyryanova O, Dénes A, et al. Uses of tree saps in northern and eastern parts of Europe. Acta Soc Bot Pol. 2012;81(4):343–357. <http://dx.doi.org/10.5586/asbp.2012.036>
 63. Seppel M. Näljaabi liivi- ja eestimaal 17. sajandist 19. sajandi alguseni. Tartu: University of Tartu Press; 2008. (Dissertationes Historiae Universitatis Tartuensis; vol 15).
 64. Vahtre L. Äärmuslikkus ja äärmusetus Eesti ajaloos. In: Rohumets I, editor. Lehed ja tähed: looduse ja teaduse aastaraamat. Tallinn: Loodusajakiri; 2004. p. 99–105. (vol 2).
 65. Sander H, Elliku J, Roht U. Eesti parkide ja kollektsioonide levinumate võõrlehtpuude ja -põõsaste introduktsioonist ja metsistumisest. In: Magnus R, editor. Uurimusi Eesti loodusteaduste ajaloost. Tartu: Estonian Naturalists' Society; 2008. p. 78–102. (Eesti Looduseuurijate Seltsi aastaraamat; vol 85).
 66. Spuhl-Rotalia J. Kodumaa marjad. Viljandi: A. Peet; 1898.
 67. Lehmann K. Kohvi-aseainete ja söögisinepi valmistamine vähemal ja suuremal määral. 2nd ed. Tallinn: J. Offril & Mõte; 1909.
 68. Vilbaste G. Sammalde, samblike ja vetikate nimesid. Gustav Vilbaste rahvaluulekogu (1907–1966) [Manuscript]. Tartu: Estonian Literary Museum; 1953. (vol T3).
 69. Jannau OA. Ma-rahva Koddõ-Arst, ehk lühhikenne juhataja, kuidas ig-gauks mõistlik innimenne ommas maias ja perres, kui kegi haigeks saab, agga arsti ep olle sada, võib aidata. Tartu: H. Laakmann; 1857.
 70. Łuczaj ŁJ, Dumanowski J, Köhler P, Mueller-Bienick A. The use and economic value of manna grass (*Glyceria*) in Poland from the middle ages to the twentieth century. Hum Ecol. 2012;40:721–733. <http://dx.doi.org/10.1007/s10745-012-9513-4>