Wild edible plants of Belarus: from Rostafiński’s questionnaire of 1883 to the present

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Abstract

Background: Belarus is an Eastern European country, which has been little studied ethnobotanically. The aim of the study was to compare largely unpublished 19th century sources with more contemporary data on the use of wild food plants.

Methods: The information on 19th century uses is based on twelve, mainly unpublished, responses to Józef Rostafiński’s questionnaire from 1883, and the newly discovered materials of the ethnographer Michał Federowski, who structured his data according to Rostafiński’s questionnaire and documented it with voucher specimens. Rostafiński’s questionnaire was concerned mainly with Polish territories, but for historical reasons this also encompassed a large part of Belarus, and we analyzed only the twelve responses (out of the few hundred Rostafiński obtained), which concerned the present Belarus. These data were compared with a few 20th century ethnographic sources, and our own 40 interviews and questionnaires from Belarus.

Results and discussion: 58 taxa of wild food plants used in the 19th century were identified. Some of them are still used in modern Belarus, others are probably completely forgotten. In the 19th century several species of wild greens were widely used for making soups. Apart from Rumex, other wild greens are now either forgotten or rarely used. The list of species used in the 20th and 21st century encompasses 67 taxa. Nearly half of them were mentioned by Rostafiński’s respondents. The list of fruit species has not changed much, although in the 19th century fruits were mainly eaten raw, or with dairy or floury dishes, and now apart from being eaten raw, they are incorporated in sweet dishes like jams or cakes. Modern comparative data also contain several alien species, some of which have escaped from cultivation and are gathered from a semi-wild state, as well as children’s snacks, which were probably collected in the 19th century but were not recorded back then.

Conclusion: The responses to Rostafiński from 1883 present extremely valuable historical material as the use of wild food plants in Belarus has since undergone drastic changes, similar to those, which have taken place in other Eastern European countries.

Keywords: Historical ethnobotany, Wild green vegetables, Wild food plants, Non-timber forest products, Belarus

Background

There has been a renewed interest in wild food plants in recent years due to world-wide concerns about the quality of food made from mass-produced crop plants, which are poor in micronutrients and grown in petroleum based agricultural systems [1-5]. At the same time, old traditions of plant gathering in most countries are being lost and need recording and preserving. This is also relevant for Eastern Europe. Fortunately in this part of the world many nineteenth and early twentieth century studies have managed to capture disappearing plant uses. This is one of the few places in the world where diachronic studies ranging over the period of a century are possible. Over the last few years, reviews of archival ethnographic studies concerning wild food plant use have been published in some eastern and northern European countries: Poland [6-8], Estonia [9], Hungary [10], Sweden [11] and Slovakia [12]. These reviews brought the majority of wild food plant literature and data together, enabling inter-country and inter-region comparisons. It also makes this data available for an
international readership, as they were originally, predominantly published in their national languages. However, some eastern European countries still remain terra incognita for modern ethnobotany. One of them is Belarus. We have not found any modern ethnobotanical studies concerning this country, apart from a short FAO report on crop genetic resources [13]. At the same time it is a country with a very rich folklore. It was Kazimierz Moszyński (1887–1959), the author of Kultura ludowa Słowian (the Folk culture of Slavs), who pointed out that the present area of Belarus is one of the parts of Europe where many vestiges of traditional culture had been preserved [14,15]. He made a few expeditions to the Belarusian region of Polesia himself [16] and published an ethnographic monograph of its eastern parts [17]. For many decades, Belarus was treated by Polish ethnographers as one of the most interesting, “archaic” and “backward” places of the former Polish–Lithuanian Commonwealth, ideal for ethnographic research. Even today, due to its political isolation and the fact that a part of its population still lives in traditional-style villages scattered over this heavily wooded country, Belarus is a very important place for European ethnobiology.

Moszyński was not the only Polish ethnographer fascinated with Belarus. Here we should list two other ethnographers: Michał Federowski (1853–1923) and Józef Obrebski (1905–1967). Late 19th century folklore concerning the use of medicinal plants was recorded by the afore-mentioned Federowski in the first volume of his “Lud Białoruski” (“Belarusian Folk”) [18] as well as by one of the leading Polish writers of that time, Eliza Orzeszkowa (1841–1910) [19–28]. What is amazing is that both of them left rich, detailed herbaria documenting the names of plants and their uses. The second and third parts of Federowski’s herbarium are kept in the library of Warsaw University [29] and Orzeszkowa’s main herbarium is stored in Poznań [24–28]. The first part of Federowski’s herbarium was regarded as lost until last year, when it was discovered by one of the co-authors of the article (M.G.). Additional sources of information are the materials gathered by local researcher, Zoska Wieras [30]. Thus we can conclude that the 19th century use of medicinal plants in some parts of Belarus is relatively well documented. Unfortunately, very little information has been published on the use of wild food plants from the same territory [17,31]. At the same time a large and well documented set of observations on the use of wild food plants in 19th century Belarus, made up of responses to Rostafiński’s questionnaire (mainly from 1883), is stored in two Polish botanical institutions, with most data still unpublished [31–36]. As the files of Rostafiński’s questionnaire are some of the most important ethnobotanical documents in Europe, enabling us to draw a detailed picture of the use of wild plants in Belarus at the end of the 19th century, we decided to devote a separate article to them. Our aim was to compare their content with the scattered modern data on wild food plants in Belarus.

**Methods**

**Belarus as a study area**

The state of Belarus is located in Eastern Europe. It has an area of 207 thousand km² and a population of 9.5 mln (according to the 2012 census). The population density is relatively low (46 people / km²). Belarus is a landlocked lowland country with predominantly postglacial landform. Areas of sandy soils are mixed with clays, marshes and peat-bogs. The southern part of the country (Polesia region) is very marshy. A large proportion of the population (ca. two million) lives in the capital city, Minsk. Belarus is located in an area of humid continental climate. The forest vegetation is composed of both coniferous and deciduous species. Pinus sylvestris, Picea abies, Alnus glutinosa, Betula pendula and Quercus robur are the dominant trees in the heavily wooded landscape (forest cover ca. 40%) [37]. The vascular flora of Belarus contains around 1860 species [38].

Belarus was one of the core parts of the Kievan Rus’. In medieval times it was a part of the Principality of Polotsk, the Grand Duchy of Lithuania, then the Polish–Lithuanian Commonwealth. Later, at the end of the 18th century, through the partitions of the Commonwealth, it became part of the Russian Empire. After World War I, the territory of Belarus was divided between Poland and the Soviet Belarusian Republic (the latter within Soviet Union). In 1939, the Polish part of Belarus was annexed by the Soviet Union and merged with the Soviet Belarusian Republic. After World War II, most of the large Polish minority left Belarus (now it constitutes only 3% of the population). After the collapse of the Soviet Union, it became an independent state in 1991. At the moment the Belarusian nationality dominates in the population, however, two closely related languages are official: Russian and Belarusian, with the former dominating in cities. The main minorities are Russians, Poles and Ukrainians [38-40].

Belarusian cuisine is dominated by potato dishes and bread. Dairy products and pastry dishes (i.e. dumplings) are also eaten on an everyday basis. Soups have been also a major part of dinner. Many dishes are made using fermented ingredients (sourdough bread, sourdough soups, lacto-fermented salads made from cabbage, cucumbers and tomatoes, fermented birch sap etc.) [41,42].

**Characteristics of Rostafiński’s questionnaire**

Professor Józef Rostafiński (1850–1928), a Polish botanist from Kraków (Jagiellonian University), composed a 70-question questionnaire concerning all aspects of ethnobotany (traditional cultivated and wild foods, medicine, rituals, dyes etc.). The survey was called “Odezwa
do nie botaników o zbieranie ludowych nazw roślin”, which translates as “An appeal to non-botanists to collect folk plant names”. In its largest version it included 70 questions concerning the use of plants, their cultivation, gathering and naming. It was published in 1883 in around 60 Polish language newspapers in Prussia, Austro-Hungary and Russia (at that time Poland was divided into these three empires). Rostafiński received a few hundred responses, which have been partly preserved up to the present and constitute probably the largest ethnobotanical survey of 19th century Europe. The known letters come from the years 1883–1909 (mainly 1883–84). Out of around two hundred authors who wrote to him, most sent him information concerning the contemporary territory of Poland. However, several of them reported the use of plants in the present territory of Belarus and western Ukraine, for historical reasons, as a large proportion of intelligentsia and landowners (typical of Rostafiński’s respondents) in these countries were either Polish or Polonized. In their letters they mostly referred to plants grown or cultivated by peasants, though sometimes they also supplied details on the plants used in manors [31–36].

Responses to Rostafiński were only partly used by their owner and remained, forgotten, in the Jagiellonian University for decades. They were “discovered” at the end of the 20th century on the premises of the Institute of Botany and are stored in the Museum of the Botanic Garden of the Jagiellonian University [31–36]. Twelve of them contain information on the present Belarus and were analyzed in this paper (Table 1). Most of the information contained in them and the original text have not been published, apart from scattered notes on the use of some species (Heracleum and Aegopodium – [8,36], tree saps – [8,36,43]). The correspondence with one respondent, Maria Twardowska, was characterized in a separate paper [31].

Apart from them, in 2012, another response to Rostafiński’s questionnaire was found by one of the co-authors of this article (M.G.) in the herbarium of the Warsaw University. This never-sent response belongs to the author of this article, M. G., in the herbarium of the Warsaw University. It contains material gathered between 1879 and 1891, but the date of the manuscript is “November 1883” (straight after the publication of Rostafiński’s questionnaire). It is not sure if Federowski ever thought of sending the materials to Rostafiński. It is also possible that he found his questionnaire a useful framework for his own work. This part of the herbarium, concerning non-medicinal uses must have been assembled from the plants he had dried earlier.

Rostafiński’s questionnaire included several questions concerning the use of wild food plants:

6) Is ber [Setaria italica] grown? do people gather wild ber and other wild grasses, particularly:

7) manna, mielec [both refer to Glyceria], stoklosa [Bromus], in what quantities, do people use it themselves or bring it to town market?

21) Do people know (at least from tradition) the names kucmerka and słodyczą [the question referred to old names of Stachys palustris and Polypodium vulgare, for details see [50].

23) Do local people gather herbs in spring to be used in soups, particularly in famine years, and these herbs are?”.

This is followed by questions 24–33, in which he asks if people know the names of particular plants. These seem like continuations of question 23, as most of the listed plants are green vegetables: Urtica (as pokrzywa, żagawka) and Glechoma (as kurdybanek, bluszczyk) – no. 25, Rumex and Oxalis (as szczaw, zajęceczka) - no. 26, Heracleum (as barszcz “plant” – to differentiate it from the soup also called barszcz) – no. 27, Aegopodium podagraria (as gir, girz in no. 28, and śniatka in no. 32) and Artemisia abrotanum [as Boże drzewko] “or other plants fried with butter”. In the responses to these names people usually reported not only local names but also the way these species were eaten.

And further:

34) Salads and herbs eaten raw, which [plants]?
43) What do the names _wiśnie_ [sour cherry], _trześnie_ [wild sweet cherry], _czeremchy_ [chokecherry] mean in a given place?

44) Is the name _dracz_ known for barberry? What berries do people know and under what names: a) raspberry-type composed fruit: pink like raspberry or dark blue, shiny like plums (blackberry), b) currants, red and black with stinking leaves, c) gooseberry, d) strawberry, e) small undershrubs with shiny leaves and round berries, red (_brusnice, kamionki_) or black (_borówki and _lohynie_ vel _pijanice_), f) with more oblong berries[,] cranberries, Cornelian cherry? Or other names?

50) Are nigella, coriander, dill, fennel, anise and caraway cultivated in manor gardens? [although these are mainly cultivated species, the question yielded answers on the use of wild caraway]

58) Do people buy culinary oil or make it themselves? From what? Flax? Cannabis? Poppy (grey or white), sunflower, rape? Or from traditionally used ingredients? [some of the answers concerned wild taxa]”

We also extracted information on wild food plants from the remainder of the letters sent in response to Rostafiński, sometimes in the form of digressions or loose observations.
Thirteen responses to Rostafiński’s questionnaire were analyzed (including the Federowski’s materials). The information contained in them comes from many places in Belarus: from the south and south-east (Polesia), west (Hrodna, Vawkavysk, Pruzhany, Slonim), central part (e.g. Minsk and Iliumenn/Cheyerev), and north (Vileyka) (Figure 1). In many cases the respondents supplied Latin names of the plants they mentioned. Federowski additionally provided voucher specimens for most of the plants he reported (Figure 2). For nearly every plant he also provided a separate note on its use and, separately, the Belarusian peasant name and the name used by the Polish szlachta zaściankowa (i.e. poorer mainly Polish landowners of noble origin), who often farmed the land themselves but held Polish aristocratic titles and coats of arms. The north-western part of Belarus which Federowski studied was a nearly equal mixture of these two social and ethnic groups.

20th and 21st century data
In order to relate the data from Rostafiński’s questionnaire to the present-day use of plants in Belarus, we tried to gather the scattered data on the use of wild food plants in the 20th and 21st centuries:

- One of the authors (T.G), in 2010 and 2011, interviewed middle-aged and elderly women (aged 45–85) about the use of all food plants (from three locations: the Minsk agglomeration (n = 19), the village of Katka (in the Mahilev region, n = 10) and the village Galyenchitsy (near Ivatsyevichi, in the Brest region, n = 1), as a part of a bachelor’s thesis supervised by another co-author (A.P.), who also took part in some of the interviews.
- The list of plants was extended by interviews and questionnaires supplied by E.P. (n = 10), carried out in 2010–12. This includes five lists of traditional wild food compiled by Belarusian botanists (based on their autobiographical observations from their home places): Dr Oleg Sosinov, associate professor in the Faculty of Botany, University of Hrodna, information from: Kapyl’ county (Minsk region) and Hrodna county, Dr Alla Aleksandrovna Pogodzkaya, Faculty of Pharmacognosy, Vitebsk State Medical University, (info from Homyl’ region), three botanists from the Belarusian Bielovyezhskaya Pushcha National Park; two with E.P.’s elderly family members came from the villages around Hlybokaye (Vitebsk region) and three interviews carried out in the Bryest and Hrodna regions by E.P.’s students of Belarusian origin (carried out with their own elderly family members).
- Information from two 20th century publications containing data on wild food plant use in southern Belarus (Polesia) [17,51-53].

Figure 1 The location of information on plant uses, in most cases county towns, are marked but the information concerns the whole county.
The contemporary data are presented using transliteration of the Cyrillic alphabet for Belarusian/Russian names and using the official Polish orthography for Polish names. Belarusian plant names and contemporary geographical names were Romanized using the BGN/PCGN standard used by the United States Board on Geographic Names and by the Permanent Committee on Geographical Names for British Official Use [56].

Results

Fifty-eight identified botanical species were mentioned altogether by Rostafiński’s respondents from Belarus. Five taxa remained unidentified (Table 3). The largest category is composed of the green parts of plants (27 species), which were usually consumed in the form of soups (23 species). Two kinds of soups were distinguished: sour (kisła vara) and non-sour (prespna vara). The first was made by leaving the ingredients to ferment for a few days or by adding acidic ingredients. Sorrel (Rumex spp.), ground elder (Aegopodium podagraria) and hogweed (Heracleum sphondylium s.l.) were used in sour soups. Nettle (Urtica spp.) and fat hen (Chenopodium album) were, according to Federowski, made into non-sour soups, though other data suggest that sometimes they occurred in sour soups as well and that this division is not very sharp. Sorrel was sour by itself, whereas hogweed was probably lacto-fermented. Soured birch and maple sap were also added to wild vegetable soups (e.g. with ground elder) to make them sour. According to Federowski one of the wild vegetables were commonly dried for winter use. Apart from the wild plants his herbarium also contains two cultivated species (thus not included in Table 2) eaten raw as salads: Borago officinalis L. (voucher specimen 21; hurecznik, ahurecznik/ogórecznik eaten with cream and salt) and Tropaeolum majus L. (22; nastulek, nastulka, flowers eaten with cultivated lettuce). He also mentions the raw use of some wild lettuce called zieziulina salata, but does not provide a specimen.

The second largest category, 18 species, was made up of fleshy fruits. Fruits in 19th century Belarus were mainly eaten raw, as a few of Rostafiński’s respondents pointed out. Sometimes they were incorporated into dishes with milk or dough (soup, dumplings, kisiel/kisyel’). Only manors prepared more sophisticated wild fruit desserts containing sugar.

A few spices are also mentioned, such as the fruits of Carum carvi, roots of Armoracia rusticana or aromatic leaves put under baking bread (Quercus robur, Acorus calamus).

No underground wild plant organs were gathered apart from the already mentioned horseradish and bracken (Pteridium aquilinum) rhizomes used only in the Vileyka region: during bad harvest years dried bracken was...
| Modern local name (transliterated from Cyrillic apart from Polish names following Polish orthography) | Part | 20th – 21st century use | Source |
| --- | --- | --- | --- |
| **Acer platanoides** L. | klyon, yavor leaves | leaves under baking bread | EP |
| **Acorus calamus** L. | ayer (also PL), air, babki leaves, shoot center | leaves under baking bread, formerly; shoots formerly as a spring snack | [51], EP, FS |
| **Aegopodium podagraria** L. | snitka leaves | soup | EP |
| **Allium sp.** 7 | PL: dziki czosnek leaves | spice | EP |
| **Allium ursinum** L. | cheremsha leaves | raw | EP |
| **Aquilegia vulgaris** L. | vodosbor nectar | raw children’s snack | EP |
| **Armoracia rusticana** G.Gaertn., B.Mey. & Schreb | khen | roots and leaves | TG, EP |
| **Artemisia absinthium** L. | polyn’ leaves | herbal teas | EP |
| **Berberis vulgaris** L. | n.d. fruit | raw, snack, juice or salted | EP |
| **Betula spp.** | byenyoza sap | fresh and fermented (such drink is called byarozavik) | TG, EP, PAE |
| **Carum carvi** L. | tmin, kmin fruits | spice for bread and sauerkraut | TG, EP |
| **Chamomilla recutita** (L.) Rauschert | n.d. inflorescences | herbal tea | EP |
| **Chenopodium album** L. | labadá (mistakenly as Atriplex), PL: lebioda leaves | formerly in soups | [51], FS |
| **Corylus avellana** L. | oryekh, aryekh, aryéshnik, lyeshina, fruits | mainly raw | [17,51], EP |
| **Crataegus** sp. | boyáryshnik fruits ("jablochki") | fresh and in jams, wine | TG, EP |
| **Dactylis glomerata** L. | yezha stalk | inner part as a snack | EP |
| **Fragaria** spp., mainly **F. vesca** L. | sunita, zyemlyanika fruits | raw, jams, wine etc., formerly also eaten with milk and cream | [17,51], EP |
| **Glyceria fluitans** (L.) R.Br. | manna, máyna grains | used until late 1940s to make kasha | [17,52,53], PAE |
| **Hippophaë rhamnoides** L. * | oblyepikha fruits | fresh, juice, jams | TG |
| **Humulus lupulus** L. | khmyel’ fruits | formerly dried, spice for beer and mead and added to bread dough | [17,51], EP |
| **Juniperus communis** L. | n.d. pseudo-fruits | raw children’s snack, spice for food and alcoholic beverages | EP |
| **Lamium album** L. | n.d. nectar | raw children’s snack | EP |
| **Linaria vulgaris** L. | lviny zyev nectar | raw children’s snack | EP |
| **Lotus corniculatus** L. | miadunka nectar from flowers | raw children’s snack | EP |
Table 2 Contemporary use of wild food plants (20-21st century) (Continued)

| Plant                                      | Part(s)                      | Use                                                                 | Source    |
|--------------------------------------------|------------------------------|----------------------------------------------------------------------|-----------|
| Malus sylvestris Miller or Malus domestica Borkh. | jáblyki fruits              | eaten raw, dried, lactofermented in sauerkraut or boiled             | [17,51]   |
| Malva pusilla Sm. | yagodki immature fruits    | raw children's snack                                                  | EP        |
| Nymphaea alba L. | mąkowka (for fruits), húski (for the plant) seeds | raw as a snack                                                      | [17]      |
| Oxalis acetosella L. | zayachya kapusta, záyachy shchavyl', zayach'ya kapusta, kisltsa leaves | raw children's snack, formerly sometimes used for soups         | [51], EP   |
| Picea sylvestris L. | sasná resin(1), young shoots(2) | raw children's snack(1), famine food(2)                              | EP        |
| Plantago lanceolata L. | n.d. leaves                | salads                                                               | EP        |
| Poa pratensis L. | travka young shoots         | raw children's snack                                                  | EP        |
| Polygonum bistorta L. | PL: wędzownik leaves | eaten with bread during World War I                                  | FS        |
| Prunella vulgaris L. (? | PL: czemberok aerial parts | infusion drunk as everyday drink                                       | FS        |
| Prunus cerasifera Ehrh.* | alychá fruits             | fresh and in jams                                                     | TG, EP    |
| Prunus spinosa L. | n.d. fruits                | spice for alcohol, raw snack                                         | EP        |
| Pulmonaria officinalis L. cf ssp. obscura (Dumort.) Murb. (syn. P. obscura Dumort.) | myeduntsa flowers | fresh nectar as a snack and made into herbal teas                  | TG, EP    |
| Pýrus pyraster L. | hróshka, hrusha, ihrushka, grusha lyesnáya | fruits – fresh or dried; twigs – decoction; leaves as spice for fermented sauerkraut, cucumbers and tomatoes | [17,51], TG |
| Quercus robur L. | dub leaves and bark         | formerly under baking bread                                          | [51], EP   |
| Ribes nigrum L. | smoródna chyérmaya fruits, twig and leaves | raw or in boiled dishes, formerly fermented in water and sugar | [17,51], TG |
| Ribes uva-crispa L. | kryzhóvnik fruits          | fresh                                                                | TG, EP    |
| Robinia pseudoacacia L. | n.d. flowers               | formerly raw snack                                                   | EP        |
| Rosa canina L. and other spp. | shipóvnik sobáchyy | fresh and in jams, wine and herbal tea                               | TG, EP    |
| Rubus caesius L. | yezheviča fruits           | raw                                                                  | EP        |
| Rubus chamaemorus L. | struzhýna fruits           | raw                                                                  | [51]      |
| Rubus idaeus L. | malina fruits              | fresh, jam, formerly dried as medicine inducing sweating            | [17,51], TG, EP |
| Rubus saxatilis L. | kamyniltsa, kostyanika fruits | raw                                                                   | [17], EP   |
| Rubus subgenus Rubus | ažhýna, ozhýna, struzhýna fruits | mainly raw due to low abundance, sometimes in wine and hot desserts | [17,51], EP |
| Rumex acetosa L. | shchavyl', shchavyey leaves | sour soup called borshch                                              | [17,51], TG, EP, PAE |
| Rumex acetosella L. | verabyóvy shchavyl' leaves | sour soup called borshch                                              | [51]      |
Table 2 Contemporary use of wild food plants (20-21th century) (Continued)

| Species                          | Use                  | Notes                                                                 |
|----------------------------------|----------------------|----------------------------------------------------------------------|
| Rumex confertus Willd.           | shchavyey leaves     | soup                                                                  |
| Sambucus nigra L. n.d.           | fruit                | juice, wines, rarely also raw                                        |
| Sorbus aucuparia L. nyabina, rabina | fruits               | mainly jam from frozen fruits, also raw as children’s snack and in herbal infusion or as spice |
| Sorbus intermedia (Ehrh.) Pers.  | n.d.                 | gathered from city greenery in Minsk for preserves                   |
| Stellaria media (L.) Vill.       | leaves               | fresh in salads, squeezed into juice                                 |
| Syringa vulgaris L. * syren’     | nectar from flowers, leaves | raw children’s snack                                                  |
| Taraxacum sp. n.d.               | nectar from flowers, leaves | raw snack, leaves also in salads                                    |
| Thymus spp. n.d.                 | flowering tops       | herbal infusion, spice for alcohol                                   |
| Tilia cordata Mill.              | flowers, leaves      | nectar and leaves as children’s snack, infusion from flowers as beverage |
| Trifolium spp., mainly T. pratense L. kleyvier | nectar from flowers | raw children’s snack                                                 |
| Úrtica dioica L. and U. unens L. krapyva, PL: pokrzywa | aerial parts | potherb, now rarely, formerly also sour soups |
| Vaccinium myrtillus L. chernitsa, charntsa, chyernika, | fruits and leaves | fruits – fresh, jams and juice, or in milk soups, leaves as spice for fermented sauerkraut, cucumbers and tomatoes; the most widely gathered wild fruits in Belarus |
| Vaccinium oxyccocos L. klyuka, klukva, zhuravina | fruits | fresh, jam, kisel, juice, formerly also added to sauerkraut |
| Vaccinium uliginosum L. lohymya, buyaki, golubika; PL: pjanica | fruits | raw, in many places considered inedible |
| Vaccinium vitis-idea L.   | brushtitsa, brus’ntsa, brusnika | fruits | raw or jam |
| Viburnum opulus L. kalina | fruits | jams, boiled in kisyl’, raw – after drying |
| Vicia tricolor L. n.d. | aerial parts | herbal tea |

* a non-native cultivated species also collected from the populations escaped from cultivation.

EP Eva Piroznikow’s questionnaires from Belarusian respondents (mainly botanists); TG Tanya Gervasi’s field interviews; PAE Data from the Polish Ethnographic Atlas – retrospectives of Poles resettled from Belarus in the 1940s; FS Adam Fischer’s archives (Polish Folklorist Society, Wroclaw).
| Scientific name                      | Rel. | Local name in 19th c. | Part used | Use                                                                 | Vo. | Letter**** |
|-------------------------------------|------|-----------------------|-----------|----------------------------------------------------------------------|-----|------------|
| Acer platanoides L.                 | H    | klon                  | sap       | fresh or added to sour soups                                          | 50  | FED, WOJ   |
| Acorus calamus L.                   | L    | ajer, tatarak          | leaves    | leaves added under baking bread (which was supposed to have carcinative properties as well) | LAS |           |
| Aegopodium podagraria L.            | H    | śniatka, snitka, śniatka, PL: śniatka | aerial parts | soups, sour and non-sour, potherb, rarely dried for winter use | 4   | CZA, DYB, FED, KOR, LAS, LES, NAR, OSS, SLO, TWA, WOJ |
| Allium sp.?                         | N    | PL: czosnek dziki     | n.d.      | n.d.                                                                  | LAS |           |
| Anchusa arvensis (L.) M.Bieb.       | H    | padosocik, PL: podosocik | aerial parts | non-sour soups                                                      | 11  | FED        |
| Anethum graveolens L. (? )          | N    | kopr                  | aerial parts | spice                                                                 | LES |           |
| Armoracia rusticana G.Gaertn., B.Mey. & Schreib | O  | chrin, PL: chzan      | n.d.      | so obvious that use not given, only one author wrote about salad with vinegar | (LAS, LES, NAR, NIE, OSS, TWA, WOJ) |           |
| Berberis vulgaris L.                | N    | berberyś (also PL)    | fruits    | raw                                                                   | FED |           |
| Betula spp.                         | H    | bereza, bieroza, PL: bizoza | sap       | fresh, added to sour soups, fermented into a refreshing drink with dried apples, bread rinds and oak bark, or sugar | 45  | FED, NIE, WOJ |
| Carum carvi L.                      | L    | kmin                  | fruits    | spice for bread, sauerkraut, fresh cheese, spices                   | CZA, DYB, FED, OSS, SLO, WOJ, (LAS, ONU) |           |
| Centaurea cyanus L.                 | H    | wałoszka, PL: wałoszka, włoszka, bławatki | very young shoots | non-sour soups                                                     | 9   | FED, KOR   |
| Chenopodium album L.                | H    | lebieda, PL: lebieda   | aerial parts | non-sour soups, dried for winter use                                | 14  | FED, KOR, CZA, ONU, OSS, WOJ, (TWA) |
| Cirium avense (L.) Scop.             | H    | asot, PL: oset        | aerial parts | non-sour soups                                                       | 10  | FED        |
| Convolvulus arvensis L.              | H    | bierozka, PL: bierozka, brzózka | aerial parts | non-sour soups                                                      | 7   | FED        |
| Corylus avellana L.                 | H    | harieszyna, PL: orzechy, orzeszyna, leszczyna | fruits    | n.d.                                                                  | 48  | FED, LAS   |
| Fallopia convolvulus (L.) Alöve      | H    | podbierozka (also PL) | aerial parts | non-sour soups                                                      | 8   | FED        |
| Fragaria spp., mainly F. vesca L.   | H    | sunicy, pazoniki, poziemi, sunyca, PL: poziomki | fruits    | raw                                                                   | 26  | FED, OSS, (LAS, NIE, WOJ) |
| Glyceria fluitans (L.) RBr. and most likely other related Glyceria species (in the letters as Glyceria and Glyceria fluitans) | L  | manna (also PL), majhno | grains    | made into groat (kasha), mainly boiled in milk, sold in the market of Pinsk, in many places stopped being used in the 1850-60s | FED, LAS, NIE, ONU, OSS, SLO, TWA, WOJ |           |
| Helianthus tuberosus L*              | N/D  | bulba, bulwa          | bulbs     | roasted or fried, mainly planted but one report says that it was very persistent and "self-sowing" | (DYB, NAR, ONU, TWA, WOJ) |           |
| Plant Name                          | Continent | Uses                                                                 |
|------------------------------------|-----------|----------------------------------------------------------------------|
| Heracleum sphondylium L.           | H         | sour soups, potherb, often dried for winter                           |
| Lamium sp. or Pulmonaria sp.?      | N         | aerial parts potherb                                                  |
| Nymphaea alba L.                   | L         | seeds n.d.                                                           |
| Oxalis acetosella L.               | H         | leaves sour soups                                                    |
| Papaver somniferum L*              | L         | seeds “for ordinary use”, i.e. bread and sweets                      |
| Plantago major L.                  | H         | leaves non-sour soups                                                |
| Plantago sp.                       | L         | leaves sour soups, potherb                                            |
| Polygonum aviculare L. or Plantago major L.? | N         | aerial parts sour soup                                                |
| Polygonum bistorta L. (syn. Bistorta major S. E. Gray) | H         | leaves, seeds sour soup, seeds for flatbread, particularly in the 1855 famine |
| Prunus padus L.                    | O         | fruits n.d.                                                          |
| Prunus spinosa L.                  | L         | PL: tamiina                                                          |
| Pteridium aquilinum (L.) Kuhn      | H         | rhizomes dried, ground and mixed with ordinary flour to make bread  |
| Pyrus pyraster L.                  | L         | fruits raw and conserved                                             |
| Quercus robur L.                   | O         | leaves under baking bread (added also due to its carminative properties as well) |
| Ranunculus repens L.               | H         | podsitnik, PL: podsitnik                                              |
| Raphanus raphanistrumum L.         | A         | leaves, potherb                                                      |
| Ribes nigrum L.                    | N/R       | leaves fruits raw, leaves used in manors to make a fizzy drink and to make vodka taste “older” (nie) |
| Ribes spicatum Robson              | N/R       | parieczki, PL: porzeczki                                             |
| Ribes uva-crispa L.                | L         | jagrest, PL: agrest                                                  |
| Rosa sp.                           | O         | PL: róże                                                             |
| Rubus idaeus L.                    | O         | fruits raw, leaves used in manors to make a fizzy drink and to make vodka taste “older” (nie) |
| Rubus nessensis W.Hall              | D/R       | jarynia                                                               |
| Rubus saxatilis L.                 | H         | leaves, fruits raw                                                   |
| Rubus subgenus Rubus (probably mainly Rubus plicatus L., R. nesensis W.Hall and R. caesius L.) | H         | ażyny, czomrye maliny, ożyna, PL: ożyny                              |

Continued...
Table 3 Wild food plants used in Belarus according to Rostafiński’s respondents (Continued)

| Plant Species                  | Country | Part(s) Used                   | Uses                                                                 | Quantity | Source(s) |
|--------------------------------|---------|--------------------------------|----------------------------------------------------------------------|----------|-----------|
| Rumex acetosa L.               | H       | leaves                         | sour soups                                                            | 16       | FED       |
| Rumex crispus L.               | H       | leaves                         | sour soups                                                            | 20       | FED       |
| Rumex sp. (probably mainly R. acetosa L.) |         | leaves and stalks              | raw and in sour soups, as OSS put: "with kvas, whey, sweet or sour milk, butter milk, cream or pig fat (slonina) with vinegar" |          | NIE, OSS, ONU, SLO, (CZA) |
| Rumex thyrsiflorus Fing.       | H       | leaves                         | sour soups                                                            | 18       | FED       |
| Sambucus nigra L.              | N       | flowers                        | formerly fried in batter, in a Polish manor, rare                    |          | SLO       |
| Scirpus lacustris L.           | L       | young stalks                   | raw                                                                  |          | NIE       |
| Silene vulgaris (Moecnch)Garcke |         | aerial parts                   | non-sour soups, dried for winter use                                 | 12       | FED       |
| Silene vulgaris (?)            | N       | aerial parts                   | pootherb                                                             |          | KOR       |
| Sinapis arvensis L.            | H       | leaves                         | soup or with kasha                                                    | 15       | FED       |
| Sorbus aucuparia L.            | N       | fruits                         | raw after freezing                                                    |          | CZA       |
| Stellaria media (L.) VII.      | H       | aerial parts                   | non-sour soups, dried for winter use                                 | 62***    | FED       |
| Trapa natans L.                | L       | seeds                          | raw and boiled                                                        |          | NIE       |
| Urtica spp. (3 records confirm U. dioica L. and 4 rec. – U. urens L.) | H       | aerial parts                   | non-sour and sour soups                                              |          | U. urens - 3 CZA, DYB, FED, LAS, LES, NAR, ONU, OSS, TWA, WOJ, (SLO) |
| Vaccinium myrtillus L.         | L/O     | fruits                         | raw, commonly dried; also boiled with milk into a kind of soup        | 27       | DYB, FED, OSS, NIE, WOJ, (LAS) |
| Vaccinium oxyccocos L.         | L/O     | fruits                         | raw, stored for months in water, in manors made into kissel (with potato flour) |          | DYB, FED, OSS, NIE, WOJ, (LAS) |
| Vaccinium uliginosum L.        | L/O     | fruits                         | raw                                                                   |          | FED, FED2, NIE, (LAS), whereas WOJ says that it is narcotic |
| Vaccinium vitis-idaea L.       | L/O     | fruits                         | raw, in manors made into jams and pickles                             | 25       | FED, OSS, WOJ, (DYB, LAS, NIE) |
| Veronica cf persica Poiret     | H       | aerial parts                   | non-sour soups, dried for winter use                                 | 13, 62***| FED       |
Table 3 Wild food plants used in Belarus according to Rostafiński’s respondents (Continued)

| Viola cf odorata L. | N  | Fiołki flowers | formerly fried in batter, in a Polish manor, rare | PL: fiołki flowers formerly fried in batter, in a Polish manor, rare | SLO |
|---------------------|----|----------------|-----------------------------------------------|-------------------------------------------------|-----|
| ?                   | mirsk | aerial parts | soups | SLO |
| ?                   | mrzyk | aerial parts | soups | SLO |
| ?                   | opich | aerial parts | soups | SLO |
| ?                   | saladucha, smaktucha, PL: soloducha | aerial parts | non-sour soups | FED |
| ?                   | zieleń sałatka | aerial parts | raw as salad (like lettuce) | FED |

Rel. Reliability of identification (after [2]): H Confirmed by voucher specimen; O Obvious common name universally used over a large area; L Probable Latin name or scientific name used in the language of a given country, given by a non-botanist; N Determined using comparative analysis of folk names; R determined with the help of the data of a species range or/and habitat; D determined with the help of the verbal description.

* A non-native cultivated species also collected from the populations escaped from cultivation.
** The voucher specimen belongs to Euonymus europaeus L., an obvious mistake.
*** The name makryca biała seems to refer to both Stellaria media and Veronica cf persica Poiret. Although in the part of Federowski’s herbarium devoted to edible plants only Veronica occurs (no. 13), in the medicinal herbarium both taxa are put together under the same name (no. 62). As the two species often grow together and have a mild taste, and bearing in mind that Stellaria media is still called makryca in Belarus, we infer that both taxa were probably used.
**** Letter codes are created from the first three letters of the author’s name, full names are given in Table 1. Author codes given in brackets mean that the species was mentioned but it is not clear if it was used as food.
Vo Voucher specimen number given by Federowski.
pounded in a wooden mortar and mixed with rye flour into ordinary grain dishes.

Out of the species in the 19th century only 32 species have been reported as used in 20th or 21st century studies. In these modern studies, however, new plant taxa are reported as used, mainly children’s snacks or alien species of fruits. Altogether, we collected data on the culinary use of 67 taxa in the 20th and 21st centuries (Table 2, 3), which gives 93 edible taxa recorded at some point between 1883 and the present.

Discussion

We can assume that only some of the plants used in Belarus in the 19th century are used nowadays. For example, using *Pteridium aquilinum* rhizomes and *Polygonum bistorta* seeds as staples was already a curiosity by the end of the 19th century. Also the reported wide use of wild green vegetables has immensely decreased in Belarus, with the exception of the use of *Rumex* spp. to make a kind of sour soup, still an important part of Belarusian cuisine. Thus, a process similar to other eastern European countries has occurred in Belarus, where the use of most wild greens has ceased [6-12,57] and the main edible plants used or remembered are fruits and children’s snacks (compare [6,58]). Also, in contemporary internet culinary forums in Belarus, fruits are the dominant wild food category mentioned. The use of wild vegetables has decreased (Figure 3) in a similar manner among the Belarusian minority in NE Poland investigated by one of the co-authors of this article (E.P.), where many of the plants listed in this study are remembered mainly as old-time poverty food (e.g. *Urtica* spp., *Chenopodium album*, *Aegopodium podagraria* etc.).

Pietkiewicz, in his 1928 ethnographic monograph of a part of Polesia, mentioned only *Urtica*, *Rumex*, *Oxalis* and *Atriplex* (mistakenly for *Chenopodium*) as wild green vegetables used in food [51], whereas Moszyński, also in 1928 [17] did not even mention the use of any other greens apart from *Rumex*, although Rostafiński’s respondents, only 40 years before, mentioned more species used in that area.

The resilience of sorrel in Belarusian and other north and eastern European cuisines [6-12, i.e. the fact that it is still widely used, while other wild greens have declined so much, is mysterious. The most likely explanation is that it is appreciated due to its sour taste and smooth texture. The sour taste has been highly appreciated in traditional eastern European cuisines and most sour foods are produced by lactic fermentation of pickling. Thus sorrel’s sour taste may have automatically placed it in the human realm of transformed food, even before it was cooked. Paraphrasing Lévi-Strauss’s division [59], instead of Raw versus Cooked (in the French original *cru* and *cuit*), we could say Raw versus Cooked/Sour. By belonging to the Sour/Cooked domain, sorrel was singled out from other wild vegetables.

The resilience of the contemporary use of wild fruits such as *Rubus idaeus*, *Vaccinium* spp. and *Viburnum opulus* in Belarus may be explained by cultural attachment to these species, which are perceived as “very healthy”. Selling *Viburnum opulus* fruits, for example, at the open markets of Minsk in September is still very popular, and most of the sellers and customers ascribed to the berries—which are sometime also consumed raw, as snacks—important preventative properties. In the 19th century *Viburnum* was not even reported as wild food, but rather as medicine. This reinforces the findings that the permanence of Traditional Plant Knowledge in the context of cultural changes may be directly related to the success of certain food plants, which are perceived as *food-medicines*, as, for example, other contemporary field ethnobotanical studies among migrants have demonstrated [60,61].

The differences between the species eaten in the 19th century (Table 2) and contemporary uses (Table 3) do not only arise from the fact that the use of some species has ceased. Some species listed nowadays may have been used in the 19th century but the amount of observations (only from 13 respondents) was not enough to capture it. Also, the structure of Rostafiński’s questionnaire was very specific, he pre-suggested certain taxa, which he was particularly interested in, which may have slightly biased the information given. Children’s snacks reported in the contemporary data must have been collected in the 19th century, but were not recorded then. A similar situation occurred in Poland, when a questionnaire among botanists revealed a long list of minor children’s snacks, never noted before [62].

The commonness of drying wild vegetables for winter use in soups, observed by Federowski, is worth noting. Drying wild greens for human use as a preservation technique occurs in parts of China (see e.g. [63]) but has not been observed in Europe. The fact that these plants were preserved suggests that they had a high cultural status. It is even more puzzling, then, that their presence in contemporary Belarusian cuisine is so reduced.

Of course, it is possible that more in-depth studies in rural Belarus would confirm the survival of some uses. Moreover, a noteworthy phenomenon is the gathering of several recently established non-native taxa. Edible fruits such as *Hippophaë rhamnoides*, *Prunus cerasifera* and *Sorbus intermedia*, which are cultivated, are also gathered from wild locations (i. e. as garden escapees) or from populations planted as a part of town greenery. Also *Rumex confertus* is a recently spreading large-leaved sorrel species incorporated into cuisine, like native *Rumex* species.

As the use of wild vegetables was more common in Belarus in the 19th century than in Poland as observed
by Moszyński, Federowski and a few other ethnographers, we can assume that even now we may find more vestiges of traditional plant use in this country, making it a promising arena for future ethnobotanical studies. Here we point out just a few of the ethnobotanical phenomena in Belarus which should be studied in detail:

- The strong tradition of fermented dishes made from both cultivated plants like cucumbers, cabbage or tomatoes, as well as wild ingredients, e.g. mushrooms (mainly *Lactarius* spp.), birch sap or wild plants used as spices for fermentation (e.g. *Quercus robur* leaves, *Ribes nigrum* leaves);
- The role of tree sap in traditional culture – as Belarus is the only country in Europe where the collection of tree sap is regulated by the state [43] and is extremely popular there;
- The culinary use of marsh and water plants in the wetlands of Polesia (in the 19th century the use of *Scirpus lacustris*, *Trapa natans* and *Nymphaea alba* was recorded in this area);
- The level of preservation of the use of wild green vegetables.

The recorded wild food plant taxa constitute 5% of the country’s flora. It is lower than for Hungary – 7% [10], Estonia – 6% [9] and Poland – 5.5% [8] but higher than Slovakia – 3.5% [12]. However, the amount of data available from Belarus is lower than from the first three countries, which means that several taxa with minor importance in traditional nutrition could be yet to be discovered. The general structure of various use categories and the sequence of their disappearance from the contemporary diet, as well as some culinary vogues (like jam-making, in the 20th century) are astoundingly similar to those reported from other northern and eastern European countries [5-12,58].

**Conclusions**

The responses to Rostafiński’s questionnaire from 1883 present extremely valuable historical material as the use of wild food plants in Belarus has since undergone drastic changes, similar to those, which have taken place in other Eastern European countries. Although most taxa reported in this study have been used in other Slavic countries, the local food culture preserved, at least up to the early 20th century, many archaic features, e.g. the wide use of laco-fermented wild food plants, drying wild vegetables for winter etc. Further studies on the level of preservation of the uses of plants reported by Rostafiński’s respondents are needed.

**Competing interests**

The author’s declare that they have no competing interest.
Authors' contributions
All the authors took part in writing the paper, additionally ŁŁ: initiated and coordinated the study and wrote the first version of the paper, PK: analyzed the history of Rostafinski's questionnaire and, together with ŁŁ, analyzed its content; MG: found Federowski’s questionnaires and provided literature on Federowski’s studies; EP, TG and AP provided field data on contemporary plant use in Belarus. All authors read and approved the final manuscript.

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