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The Use and Economic Value of Manna grass (*Glyceria*) in Poland from the Middle Ages to the Twentieth Century

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Abstract Manna grass (mainly but not exclusively *G. fluitans*) used to be widely gathered in most lowland areas of the present territory of Poland and western and southern Belarus. It had an important function as a component of tribute paid to local landowners by villagers, which led to the persistence of manna gathering even when this was not sustainable for peasants themselves. Manna grass was always an expensive food due to its time consuming gathering, but appreciated for its sweet taste and often served as dessert. In the nineteenth century marshes shrank significantly and the payment of tribute disappeared from the local economy, which gradually led to the total abandonment of *Glyceria* use around 1914. This article provides a detailed overview of *Glyceria* use as food within the borders of the former Polish-Lithuanian Kingdom (now Poland, Lithuania, western Belarus and western Ukraine) based on archaeobotanical, historical and ethnographic sources. The evidence for the continued use of manna since at least medieval times is abundant in historical accounts and ethnographic studies, but little has been reported in archaeobotanical findings due to the relatively small amounts of *Glyceria* consumed.

Keywords *Glyceria fluitans* · *Glyceria maxima* · *Digitaria sanguinalis* · Historical ethnobotany · Foraging · Wild cereals · Edible grasses · Archaeobotany · Poland

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> "These cut robust meadows, those rake hay,
> Others collect manna into sieves and, wandering everywhere,
> From quiet waters catch various fish with rods"
> From *Rural and manorial life* by Jan Gawiński (1805: 397) [translated by Ł.Ł.]

Introduction

The harvesting of wild grass seeds in the Middle East led to the subsequent domestication of a few grass species that became staple foods throughout the world (Diamond 1997; Harris and Hillman 1989; Salamini *et al*. 2002). However the collection of wild grass seeds was not restricted to this area: it was also widely practiced by North American Indians, whose main grass crop was *Zizania aquatica* L. (Maurizio 1926; Moerman 1998). In Europe, sweet manna grass (*Glyceria fluitans* (L.) R.Br.) was gathered and even traded in the area between southern Scandinavia, Germany (particularly Brandenburg), the Czech Republic and the marshes of Hungary and Belarus, with Poland at the centre of the use range (Maurizio 1926; Bastine 1963; Rasmussen 1975; Hanelt

2001; Prance and Nesbitt 2005; Svanberg 2011). Although the use of *Glyceria* grains as food is relatively well-known in the history of economic botany, the literature does not provide any detailed descriptions of the range of utilization of the species. The aim of this work is to provide a detailed overview of *Glyceria* use as food in Poland in terms of its economic role and geographic and temporal range. An interesting phenomenon is the extreme uniformity of *Glyceria* names (in Polish only *manna,* in Eastern Slavic dialects also *majny/mannik*), in contrast to the large variation in most folk plant names in Polish, which suggests high cultural importance (cf. Berlin 1992).

The area of our study was restricted to the borders of the former Polish-Lithuanian Kingdom (presently Poland, Lithuania, western Belarus and western Ukraine), where there is a plethora of Polish-language sources mentioning *Glyceria* use. The western border of the study area is quite well defined, and more or less corresponds to the pre-1939 borders of Poland. The eastern border is less clear as the borders of the Polish-Lithuanian and Russian states frequently shifted, but were usually located somewhere in the present territory of eastern Belarus and central Ukraine.

What is Manna?

The Hebrew word *manna* has been used in various countries to refer to different kinds of food. Manna was the mysterious food given to the Israelites as they crossed the desert on their flight from Egypt. Subsequently, it has been to name a variety of products, for example the sweet excretion of manna ash (*Fraxinus ornus* L.) and a few dozen other species of trees and herbaceous plants in Eurasia (Hedrick 1972; Simpson and Weiner 1989), as well as the bulbils of *Ranunculus ficaria* L. (Holuby 1958).

In Poland the word *manna* was used for three products: manna grass grains (mainly *G. fluitans*), the source of one of the main types of *kasza* (i.e., cereal groats); a cultivated cereal *Panicum sanguinale* L. (now *Digitaria sanguinalis* (L.) Scop.) grown in dry areas (Maurizio 1926, 1927) in both Poland and Germany; and the rare and expensive *Fraxinus ornus* secretion, *manna kalabryjska,* which occasionally appeared traded as medicine (Kluk 1787).

Manna Grass Ecology, Biology and Nutritive Value

All the manna grass species are typical for wet places, from small ditches and depressions in forest clearings, to lake and pond shores. In Poland the commonest species are *G. fluitans* (L.)R.Br. and *G. maxima* (Hartm.)Holmb. (syn. *G. aquatica* (L.)R.Br.) (Zając and Zając 2001). The former usually grows to 1–1.5 m and can be found in a variety of wet habitats, the latter is taller (up to 2–3 m) and grows mainly in ponds and lake margins. Other, less common native species that occur in Poland are *G. lithuanica* (Gorski)Lindm. (in wet forests in the northeast), *G. declinata* Bréb. and *G. plicata* (Fr.)Fr. (syn. *G. notata* Chevall.) (at water margins) and *G. nemoralis* (Uechtr.)Uechtr. et Koern. (near forest streams) (Rutkowski 1998).

Glyceria fluitans has the largest caryopses (recent ones – 2.3–4×1.2–1.8 mm). The smallest caryopses in the genus are found in the tallest species – *G. maxima* (1,4–2×0,9–1,5 mm). The other species' grains (e.g., *G. declinata* and *G. Plicata*) are of intermediate size (1.8–2.4×1.1–1.6 mm) (Körber-Grohne 1964, 1991, size of de-husked fruits without endosperm, artificially fossilized).

The chemical composition of cleaned *G. fluitans* caryopses (from Brandenburg, Germany) was studied only once, by Hartwich and Håkanson (1905), who reported the following composition: water (13.5 %), protein (9.69 %), fat (0.43 %), carbohydrates (75.06 %), wood fibre (0.21 %) and ash (0.61 %). It is the significantly large proportion of carbohydrates that gives manna grass its sweet taste.

Methods

Archaeobotanical literature, old herbals, cook books, economic documents and other historical sources were searched in order to extract all possible references to the use of *Glyceria.* The whole Polish ethnographic literature concerning wild food gathering listed by Łuczaj and Szymański (2007) and Łuczaj (2010a, b, 2011) was reviewed in search of information on wild grass gathering. Additionally, a few sets of archival materials were searched for the same kind of data and two of them, Rostafiński's questionnaires and the Polish Ethnographic Archives, contained relevant data.

Józef Rostafiński, a botanist from Kraków, composed a 70 point questionnaire concerning all aspects of ethnobotany ("An appeal to non-botanists to collect folk plant names") that was published in around 60 Polish periodicals in 1883 and 1884 in all the countries occupying Poland at that time, i.e., Russia, Austro-Hungary and Prussia. (Köhler 1986, 1993). The sixth and seventh questions concerned forgotten and wild cereals including manna grass. Rostafiński received a few hundred responses between 1883 and 1909. A few decades ago 121 of these replies were rediscovered (Köhler 1993; Łuczaj 2008a, b, 2010a). Another set of responses was discovered in the 1990s, and one of the authors (P.K.) recently coded their entire content into a database.

In the mid-twentieth century, the team of the Polish Ethnographic Atlas (PEA) published a few questionnaires concerning wild food plants. In the first study, from 1948–49, information was collected from 193 responses from all parts of the country, in the form of free lists, often containing very specific information and including herbarium specimens (results from 95 localities, Łuczaj 2008a; general results from all the materials, Łuczaj 2011). The next study

(1964–69), carried out in a grid of 330 villages across the country, had a separate set of questions about the use of manna grass (Questionnaire no 6, part A.I.4, page 10). The results of both questionnaires concerning *Glyceria* were mapped by the late Janusz Bohdanowicz (1933–1998) for the unpublished 7th volume of PEA, stored in the University of Silesia in Cieszyn (map 358 "Consumption of *Glyceria fluitans* and *Bromus* L."). Later studies on wild food plants in this project elicited no memories of wild grass harvesting (Łuczaj 2010a).

Results

Archaeobotanical Records

Archaeobotanical records of *Glyceria* spp. in the area of interest are very sparse. The chronologically oldest finds of manna grass (cf. *Glyceria maxima*) were found inside daub on the Neolithic site (the Funnel Beaker culture, 3rd millenium B.C.) Donatkowice 23 (Table 1; Fig. 1; Bieniek 2004; Lityńska-Zając *et al*. 2004; Tunia pers. comm), but it is possible that at least some of these specimens are *Molinia* or unripe grains of *Melica*. All the other finds of *Glyceria* date to the Medieval period and are uncharred (mostly waterlogged; Table 1; Lityńska-Zając nd; Badura pers. comm.). The most numerous remains, probably fodder remnants (almost 1000 grains of *G. fluitans* and 60 grains of *G. maxima*), were discovered in the late Medieval sample from the Main Market Square in Kraków. However, most of the Poaceae grains from medieval Kraków are not identified (Wasylikowa 1965 and later nd; Mueller-Bieniek 2011; Mueller-Bieniek and Walanus 2011).

Other finds of waterlogged manna grains come from a few sites in north western and northern Poland. In early medieval Wolin only a few *Glyceria* caryopses were found (Table 1), associated with flax processing (Alsleben 1995, 1996) and remnants of spontaneous vegetation (Latałowa 1999a). Another find (Września) was also associated with flax processing (Latałowa 1998, 1999b). In medieval Gdańsk, single scattered remains were found and only one group of about 100 grains found in a pot might suggest traces of gathering, despite the fact that the accompanying remains are mainly composed of hay meadow species (*Lychnis flos-cuculi* and *Ranunculus repens* seeds, Badura 2011: 160, pers. comm.).

Written Sources from the Fourteenth to the Eighteenth Century

Historical sources must be treated with some caution as the word manna may refer to: *Glyceria* spp., *Digitaria sanguinalis* or *Fraxinus ornus*. However, the context generally enables us to assign most records to manna grass, and the other two species occur only in a few cases. The earliest written record of manna is in the register of meals in the court of the King Władysław Jagiełło and his wife, Queen Jadwiga in the period 1389–1418 (Piekosiński 1896; Muszyński 1924; Dembińska 1963; Table 2). Manna was also noted as food for the travelling court of the Crown Treasurer Spytko from Tarnów, in

Table 1 Archaeobotanical finds of *Glyceria* grains in Poland

Site	Period	Glyceria species and no. of grains	Type of preservation	Context	Author
Donatkowice 23, near Kazimierza Wielka	Neolithic, TRB, 1sth half of 3rd millenium B.C.	maxima* (5)	ch	daub (baked clay from floors and building constructions)	Bieniek 2004
Września 7, near Słupsk	Early medieval, 1210+70 uncal bp (830+−90 A.D.) Gd 7045—8–9th c.	maxima (7)	w	a boundle of flax consisting of at least 800 plants and more than 1400 diaspores representing 92 plant taxa	Latałowa 1998
Wolin 8 (6), courtyard	Early medieval, 10th/11th c.c.	maxima (4)	w	in a flax sample with more than 120 other taxa	Alsleben 1996
Wolin I	Early medieval, 9th/10th c.	maxima (1)	w	cultural layer	Latałowa 1999a
Wolin I	Early medieval, 9th/10th c.	fluitans (2)	w	cultural layers	Latałowa 1999a
Gdańsk	Medieval, 12–14th c.	fluitans* (ca. 112)	w	in a pot from a cultural layer dated to 14th century and scattered finds	Badura 2011
Kraków-Ratusz	Late medieval, 14th–15th c.	maxima (60)	w	fodder remnants?	Wasylikowa 1965
Kraków-Ratusz	Late medieval, 14th–15th c.	fluitans (~1000)	w	fodder remnants?	Wasylikowa 1965
Kraków-Kanonicza 17	Late medieval	fluitans* (1)	m	cultural layer	Mueller-Bieniek unpubl.

ch charred, *w* waterlogged, *m* mineralised; *uncertain identification

◀ **Fig. 1** Fresh caryopses of *Glyceria* and similar *Melica* caryopses. **a** *Glyceria fluitans*, **b** *G. maxima*, **c** *Melica nutans* (ripe), **d** *M. nutans*—(unripe)

Piotrków, 26.02−11.03.1542 (Table 2). The price of manna was relatively high compared to other products, similar to rice, somewhere between the prices of meat and imported spices (Dembińska 1963; Table 3).

Manna is also mentioned in the medieval manuscript *Antibolomenum* of Jan Stanko from 1472 (Rostafiński 1900). Rostafiński identified it as the indigineous *G. fluitans* due to the reference to "manna mazowiecka" ('manna of Mazovia'). He also provided some information on other mannas in this and other medieval European manuscripts (Rostafiński 1900: 214).

The tribute paid in manna to local landowners are mentioned in the three oldest Polish agricultural handbooks, reminding landowners to collect it in late autumn. Gostomski (1588) lists it together with rye, wheat, acorns, hazelnuts, beechnuts, hemp, honey, fish and poultry. Zawacki's handbook of 1616 (Zawacki and Rostafiński 1891) reminded readers to "shake manna" in July, at the same time as caraway seeds (*Carum carvi*), and to collect manna tribute in November. Haur (1675) also reminded landowners to collect tribute around St Martin's Day (i.e., in November): castrated roosters, geese, venison, eggs, rye, wheat, oats, manna, acorns, hazelnuts, poppy, hemp and money. Manna is also referred to occasionally in seventeenth and eighteenth century documents concerning tribute in northern and western Poland (Table 2; Fig. 3). The tributes were usually from 1/2 to 3 quarts of manna (one quart, or *kwarta*=~1 litre), or one *garniec* (i.e., pot) in one of the sources. These are all small amounts compared to other goods. As the peasants' tribute were composed of largely wild products the manna is almost certainly manna grass. However, some historical economic records (Table 2) describe areas of land sown with manna and this probably refers to *D. sanguinalis,* although the sowing of *Glyceria* cannot be entirely excluded, as some efforts at *Glyceria* cultivation were made in the Ore Mountains in Germany at the end of the seventeenth century and in abandoned fish ponds in Lusatia in the eighteenth century (Hanelt 2001).

Manna is also mentioned in the German language agricultural handbooks from Silesia by Grosser (1590, Polish version 1954), and briefly by Herman from Livonia (Herman 1673). Grosser noted that two kinds of manna were known: the wild one was widely gathered from meadows, while the cultivated one was a rare curiosity (this must have been *D. sanguinalis*).

Information on gathering grains of manna grass appears in the herbals of Marcin of Urzędów (1595: 246, as *Phalaris*) and Simon Syrennius *vel* Szymon Syreński (1613: 1012–1013). The latter distinguishes two kinds of manna: a cultivated one, which is harvested by cutting, like other cereals, and a wild one. The wild one is smaller, he writes, and its grains are gathered in wet areas, using sieves, in the

Table 2 Records of manna use in 14th–18th century economic documents (manna—*Glyceria* spp., sown manna—probably *Digitaria sanguinalis*)

No. in Fig. 2	Date	Use, price etc.	Type of document	Locality	Reference
	1389–1418	8 records of manna used by the Royal court, with prices given (see Table 3)	accounts	–	Piekosiński 1896: 4, 5, 157, 180, 191, 204, 207, 523
	1542	Piotrków, 26.02−11.03.1542—among "other items": almond, sugar, horseradish, vinegar, mushrooms, manna and fruits"; further also "kasza manna" mentioned	food of the Royal Treasurer's (Spytko of Tarnów) court	Piotrków	Wyczański 1969:48
11	1564	**sown manna** slightly cheaper than wheat	lustration	Stadla (near Nowy Sącz)	Małecki 1962: 1160
12	1565	**sown manna**, 1/72 of the area of rye and 1/28 of oats, the dominant cereals	lustration	starostwo kościańskie	Tomczak *et al.* 1961: 157
	1586	the ill king Stefan was prescribed eating manna the day after he fell and wounded his knee		–	Chiakor 1839: 443
5	1616	"to give one half of pounded manna to the lord"	tribute	Oliwa	Kujot 1901: 222
2	1659–65	2 quarts per peasant, altogether 18 quarts, for 3 gr each, equals 1 floren and 24 gr (1 floren=30 gr)	tribute	Brząszewice—now Brąszewice k. Sieradza	Górski *et al.* 1996: 130
3	1659–65	1–3 quarts per peasant	tribute	Nabyszyce, Chwaliszew, Raczyce, Jankowo	Górski *et al.* 1996: 106–108, 110
6	1664	"3 sztofs of manna from everyone"	tribute to the crown treasure	Brudzawy, Krusin, Jajkowo, starostwo brodnickie	Paczkowski and Mańkowski 1938: 60, 61, 63
7	1764	1/2 to 1 quart of manna per peasant	tribute	Górki Zagajne, obl. Kcynia	Deresiewicz 1956: 266
8	1777	1 słot or 1 garniec of manna depending on the status of the peasant	tribute	Działyń, Dębnica, Brzozogaj	Deresiewicz 1956: 42–43
9	1780	communes freed from the tribute of mushrooms and manna as they had not occurred in the previous tribute of 1661	freed from tribute of manna	Kiełczygłów, Kiełczygłówek, Glina, Obrów, Stuła	Keckowa and Pałucki (1995): 570
4	1783	Nov 1783, "Specification of foods and desserts needed regularly for the lord's kitchen"; 24 garniecs ('pots') of manna per three months, amounts comparable with other foods	economic instruction for the manager of stately house		Baranowski *et al.* 1963: 319
10	1791	"I brought with me 6 quarts of manna from Zerkow"	index of transported goods	Żerków	Regestr wpędzonego inwentarza przez Jpana Stanisława Jasińskiego niegdy Jpani Ludowiki Kobyłeckiej męża do dóbr Prusinowy w czasie agituiący się Kondescensji w tejże Prusinowy 14 czerwca roku 1791 spisany i podpisany, APP (State Archive in Poznań), Kalisz gr. 483, k. 441

Table 3 Value of manna in the economic documents of the court of Queen Jadwiga and King Władysław Jagiełło (original text from Piekosiński 1896)

Year	Latin original	Translation	Standardized value gr*/lb
1389	pro II libris manne V quart.	5 quart. / 2 lb	0.625
1393	item pro portatura mannae, ryszy, radicum et specierum superscriptorum ad thezaurum I scot.	for manna, rice and above listed roots and species 1 sc.	–
1394	item pro II libris risszi dne Regine I 1/2 marc. item pro III libris manne I 1/2 marc.	for 2 lb rice 1.5 mk, 3 lb manna 1.5 mk	24? [suspiciously high, may be a mistake in unit measure]
1394	item pro II lapidibus manne issis illuc. eciam I 1/2 marc. item pro saccelis manne et ryszio III gr	for 2 stones of manna 1.5 mk, for bags of manna and rice 3 gr	1.125
1394	pro I lapide ryz I marc. pro I lapide manne III fert. pro 1/2 lapide amigdalorum 1/2 marc.	for 1 stone of rice 1 mk, for 1 stone of manna 3 fert., for 1/2 stone of almonds 1/2 mk	1.125
1394	II lapidibus manne 1 1/2 marc.	1.5 mk / 2 stones of manna	1.125
1418	pro I libra manne I scot.	1 sc. / 1 lb of manna	2

Currencies: quart.—kwartunek (4 quart.=1 gr), gr—grosz; sc.—skojec (=2 gr); mk—grzywna (marca, =48 gr); fert.—fertones (=1/4 marca) (Kałkowski 1981).

Weight units: lb—ca. 400 g, Latin libra, Polish funt, English pound; stone—Latin lapis, Polish kamień (=32 lb)

*grosz was a silver coin in 1389 worth approximately a hen or 1/8 of a sheep (Kałkowski 1981)

morning when there is dew (certainly a reference to *Glyceria*). The accompanying picture is very realistic and shows the cultivated manna, which can be easily identified due to its peculiar appearance (a few separate finger-like spikes) as *D. sanguinalis*. The indigenous manna is not mentioned in the earlier herbals of Falimirz (1534) and Siennik (1584: 194–195), who wrote only about a sweet kind of dew collected in India and Greece called manna. However Siennik's entry for manna contains an illustration of a grass looking very much like *Glyceria*.

Information on manna can also be found in most eighteenth century medicinal plant, agricultural and natural history compendiums (Rzączyński 1721: 97; Duńczewski 1751; Ładowski 1783: 102; Kulczycki 1797: 10–11; Kluk 1781, 1787:6; Jundziłł 1799: 39). Rzączyński (1721: 97) in his *Historia naturalis curiosa Regni Poloniae* wrote that manna is a good and healthy grain, which is harvested from meadows before sunrise at the end of June and in July, particularly in the Sandomierz region, and exported from Gdańsk. The author also wrote that manna was a delicacy served with butter or sugar.[1] Information about the two kinds of manna is repeated in the agricultural dictionary of Duńczewski (1751). The importance of manna grass in Poland was also noted by foreigners. The Frenchman, Hubert Vautrin, who visited Poland in 1777 (Vautrin 1808), and an Englishman, Burnett (1807) both wrote about manna as a Polish speciality.

Compared to the indigenous manna, the few references to the ash manna in texts refer only to medicinal use and usually contain the adjective Calabrian – *kalbaryjska, kalabryna* (e.g., Kluk 1787: 13–14; de La Servolle 1789).

The Nineteenth Century

Manna grass was probably still widely collected at the beginning of the nineteenth century. It appears in dictionaries as a familiar food, as it did in the eighteenth century. For example, Linde (1809: 27) wrote in his Polish language dictionary that "it is gathered in some regions, particularly in Polesia; it is a good groat." From this period we also have the bucolic poem *Żywot ziemiański i dworski*; (Gawiński 1805: 397) quoted at the beginning of this article.

In his agricultural handbook (1845) published in Wilno, Wyżycki states that manna grains from "Lithuania, Poland and Prussia" are exported from Baltic harbours in considerable amounts. He describes the process of collecting manna with a sieve at dawn while there is still dew. Grains were subsequently dried and then pounded in a wooden mortar with damp straw at the bottom in order to remove "shells" (1845: 21–22). The remnants could be fed to horses as medicine against parasitic worms. Wyżycki also describes manna as willingly eaten by fish, and for this reason it should be encouraged in the wild and even sown. He advises sowing in summer with 8–12lbs of seed per Lithuanian

[1] A recipe for pancakes with manna appeared in the second oldest Polish cookbook (from 1686), recently published from a manuscript (Dumanowski and Jankowski 2011, recipe 182).

Fig. 2 *Glyceria caryopses* in archaeobotanical materials. **a** cf. *G. maxima* (charred), Donatkowice; **b** cf. *G. fluitans* (mineralized), Kraków, Kanonicza St. 17

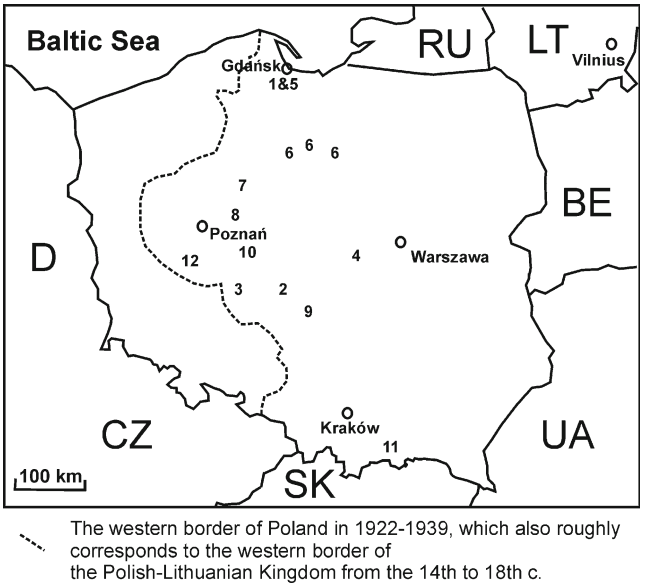

Fig. 3 The distribution of accounts of *Glyceria* gathering in 15–18th century sources. Numbers 1–10 relate to manna, which is most likely *Glyceria,* circled numbers 11–12 relate to the accounts of sown manna, probably *Digitaria sanguinalis.* Numbers correspond to the information given in Table 2

morgen (acre). The price of *Glyceria fluitans* seeds appeared in an anonymous article devoted to the seed trade in an agricultural magazine in Chełmno in 1868 (Table 4).

In Czerwiakowski's (1861: 25) medicinal botany handbook, milled manna grass grains (*semen Graminis Mannae*) are mentioned only as a dietetic supplement.

Polish readers could also find a recipe for manna grass preparation in the Polish edition of a cookbook highly popular in Brandenburg written by Sophie Wilhelmine Scheibler in 1815 (Szeyblerowa 1835). The last time manna recipes appeared in in Poland was in one of the most influential cookbooks of the nineteenth century written by Lucyna Ćwierczakiewiczowa (1860 and subsequent editions).

In 1883, when Rostafiński circulated his ethnobotanical questionnaire, manna was still either used or remembered by many people, but by this time it was definitely regarded as a curiosity. Information about the use of manna occurred in 98 responses. Evidence of manna gathering could be found in virtually all parts of the former Kingdom of Poland (Fig. 4).

Several accounts of manna grass use also come from Belarus, particularly from marshy Polesia on the border with Ukraine, where its use was so familiar that Rostafiński's respondents usually listed whole *powiats* (counties) where the species was used.

Around half of the accounts of manna refer to it as to a contemporary phenomenon, the other half as a recently extinct wild crop remembered by respondents or their parents or grandparents. In a few cases the time it was last seen on sale was provided (e.g., "thirty years ago").

Some respondents describe in detail the manner of manna collection (number of accounts in parentheses): it was gathered by women (5) a few days before St John's Day (24 June) (1) with dense flour sieves that were shaken around so that the grains fell into them (13), only before sunrise when dew covered the meadows (7). One respondent mentioned that the sieves should have long handles and only very strong people could collect manna, another that it was sold on St Peter and Paul's Day (29 June).

After collection, the grains were dried and often cracked into smaller pieces like other types of groat (*kasza*). Out of 21 respondents who specified the culinary use 16 used the word *kasza*. Six respondents mentioned that manna is boiled with milk. One respondent mentioned that it was boiled with milk and cinnamon or wine added. One respondent mentioned adding it to broth, another mentioned using it in soup (*krupnik*), and another mentioned its use in flatbreads.

The two characteristics that are commonly mentioned in accounts of manna use are its superior taste and its time consuming collection, which resulted in high prices so that

Table 4 Market prices of manna at the turn of the 19th and 20th century

Source and year	Area	Price	Value compared to
Anonymous 1868	The species was recommended in an agricultural magazine as a good grass for sowing in wet areas, no food context was present.	1 zł / garniec [4 l], 18 thalers / korzec (128 l)	~6 times the price of wheat: 1 korzec of wheat in the same magazine=3 thalers
R 1883	Letter from Jaraczewo, W Poland, but the currency suggests that the information comes from the Russia-dependent Kingdom of Poland	4 zł [=60 k] / l [= ~0.7 kg]	~13 times the price of wheat: in 1883 in the Russian Empire 1 pud [16.38 kg] of wheat cost 109 k; i.e. 1 kg of wheat cost ~6.6 k (Maciejewski and Sadowski 2007)
R 1884	Romanów near Włodawa (E Poland)	5 zł [=75 k] / garniec [4 l, ~2.8 kg]	~2.7 times the price of wheat, calculation as above
probably early 20th century (Ciszewski 1925)	Białowieża Forest, E Poland	50–60 k / garniec [4 l] paid to collectors	impossible to estimate (no date given)
R 1883	Raczyce and Uciachów near Odolanów, W Poland (Poznań Principality)	1 mk / l of clean grain [~0.7 kg]	In the 1880 s a ton of wheat cost over 100 mk so manna was >14 times more expensive (Webb 1997). Price comparable to pork. In 1885–1891 in Poznań Prinicpality workers' wages ranged from 1 to 3 mk for a day's work (12–16 h), in 1885 agricultural workers during harvest got ~1 mk per day (Szwagrzyk 1973). In 1893 in Stettin 1 zentner (i.e. 100 lb) of potatoes cost 1.75 mk. In 1900 1 kg of pork cost 1.5 mk, 1 kg butter—1.86 mk, 1 l milk 0.2 mk, 1 kg sugar 0.65 (Heutger 2004).
R 1883	Tylice near Lubawa, NE Poland	60 pfennigs (0.6 mk) / słój ("a little more than a litre")	half the price of pork, calculation—see above

R Rostafiński's archival data; *zł* złoty (currency of the Kingdom of Poland, equivalent of 15 Russian kopeks); *mk* Prussian mark; *k* Russian kopek

in some areas it was collected only for the rich. Rostafiński's respondents reported relatively high prices in the following markets: Grajewo ('every Friday'), Janów Podlaski, Węgrów near Siedlce, Sokołów, Janów, Międzyrzecz, Biała Podlaska (2 accounts), Włodawa (2), Przasnysz and Chorzele, Łomazy and in the Dąbrowa Tarnowska area. It could also be bought in Warsaw, Kraków and Tarnów. In many areas it was also sold directly to manors (4), Jewish merchants, who also ate it themselves (3) and even to priests (1). Manna grass was several times more expensive than wheat (Table 4).

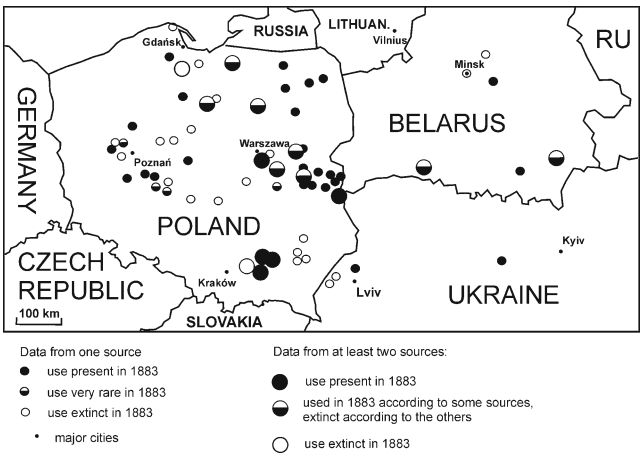

Fig. 4 The distribution of accounts on *Glyceria* gathering from Rostafiński's questionnaire of 1883

Manna was used both by landowners and peasants, although there was a considerable local variation in who used the species. Four respondents from central Poland also mentioned the previous use of manna as a tribute (Nowa Wieś near Słupca; Zabłocie near Łask; Piotrków Trybunalski area; Kamieniec near Siedlce). A contemporary of Rostafiński, Pleszczyński, wrote in his ethnographic monograph of the Międzyrzec Podlaski area of eastern Poland that manna from *Glyceria fluitans* was still gathered there (1892).

Only two accounts of manna probably refer to *D. sanguinalis*. A respondent from Baczków near Bochnia wrote: "manna can be found in millet [this probably refers to *D. sanguinalis*] but in the old times people went with sieves to

the Niepołomice Forest [this refers to manna grass].” Also a respondent from Międyrzecz in western Poland wrote that manna is sown (but this may refer to both genera).

Twentieth Century Studies

Władysław Szafer wrote an article about manna in an ethnography and tourism journal for young people (1925). He stated that manna had still been sold in some markets of the Sandomierz Lowlands around Mielec, Dąbrowa Tarnowska and Tarnobrzeg until the end of the nineteenth century. The collection of manna was temporarily revived during World War I between 1915 and 1918. Szafer asked his readers to collect information on the last cases of the use of manna. He also quoted a letter from his father who gathered information from Trzciana near Czermin, Sandomierz Lowlands, describing two kinds of manna, not only grains but also sweet liquid gathered at dawn at the end of June.

Ciszewski (1925) mentions the contemporary but disappearing use of manna grass in Brzuza near Węgrów, in Brańsk, in the Białowieża Forest, and further east in Prużana (Пружаны) and Kobryń (Кобрын) counties, now in Belarus. He wrote: “Village women from the Białowieża Forest usually sell the collected *kasza* to Jews, who pay them 50 to 70 kopekas per *garniec* [pot], depending on the year’s crops.” Ciszewski, like Szafer, mentions that women from Brzuza told him that manna is actually a secretion from the grasses, which melts when the sun rises!

Chętnik (1936), writing of the Kurpie area of central-north eastern Poland, reports using two species: *G. fluitans* in wet meadows and *G. plicata* on forest edges. In the early twentieth century they were remembered only as famine food collected by women and children into sieves and pounded into groats, which were boiled and eaten as *kasza.*

Moszyński (1928) also mentions manna gathering in his monograph of eastern Polesia (eastern part of Mozyr county and Rzeczyca county, now south eastern Belarus). And in his “Folk Culture of Slavs” (1929) he wrote that in parts of Polesia Polish settlers collect manna, although local Poleshuk population does not.

The private archives of Professor Adam Fischer stored in the archive of the Polish Folklore Society in Wrocław contain the only note about the gathering of manna grass in Lithuania, in Janów, now Jonava (“Z teki Łaguny”, no. 4439, p. 771) In the PEA studies (1948–49 and 1964–69), far fewer records of manna were found than in the Rostafiński questionnaires, and all of them referred to its collection in the nineteenth century or, rarely, the beginning of the twentieth century up until World War II (Fig. 5). Four of the PEA respondents reported making soup out of manna grass, six—making groats, three remember that the soup or groats were made with the addition of milk. In Wola Radłowska (near Brzesko) manna grass was also added to dumpling

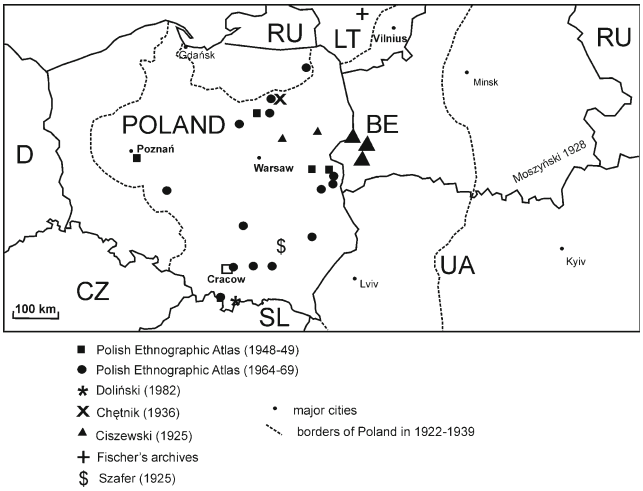

Fig. 5 The distribution of accounts on *Glyceria* gathering in Polish 20th century ethnographic sources. All these records refer to the extinct use in the second half of the 19th century and the first half of the 20th century

(*pierogi*) filling, mixed with cheese. No post-1945 records of *Glyceria* gathering are known in the present territory of Poland. [2] Apart from the PEA studies and Doliński’s (1982) note on the memory of gathering manna grass in the early twentieth century in the village of Łapsze Niżne in southern Poland, there is no mention of manna use in modern ethnographic literature. However, the term *kasza manna*, originally, or at least from the Renaissance, assigned to *Glyceria* and *Digitaria* groat, is commonly used to refer to the smallest type of wheat and this is widely available in Polish shops nowadays.

Discussion

Species Identification

Not a single voucher specimen of manna from these studies has been identified, but a few of Rostafiński’s respondents provided the name *G. fluitans.* Also, all the older botanical sources refer to this species (earlier as *Festuca fluitans*) as the edible manna. Only Chętnik (1936) wrote that two species were used: *G. fluitans* and *G. plicata* (under the synonym *G. notata*), whereas Maurizio (1926) suspected the use of *G. nemoralis*, together with *G. plicata.* Other botanical authorities uniformly refer to manna as *G. fluitans* (Wyżycki 1845; Szafer 1925; etc.). A look at the scarce archaeobotanical material on *Glyceria* use shows that all the

[2] However, settlers from Polesia who moved to Wrzosy near Wołów, gathered manna grass until they were removed from their village in 1946. They cooked it with milk into a kind of soup eaten with bread.

taxa from the genus could have been used: mainly *G. fluitans* but also *G. maxima* and other species. *G. fluitans*, although a much smaller plant than *G. maxima*, has larger grains, which may be the reason why it was more commonly gathered.

The Rise and Fall of Manna

Dembińska (1963, 1976; also Dembińska and Weaver 1999) noted that evidence of the culinary use of *Glyceria* does not appear in Poland until the thirteenth century. She presumed that *Glyceria* use may have been imported from another region. Earlier finds of manna grass are known only from ninth-tenth century Wolin, an island on the very north-west border of Poland and for most of Polish history not part of it. Manna gathering may have been introduced from Germany. On the other hand the archaeological records of *Glyceria* in Germany are also scarce, and, similar to Poland, restricted to just a few finds (Behre 1991, 2008). It is possible that manna gathering, once a rare or localized custom, became more widespread in response to its introduction as part of obligatory tribute. This hypothesis is supported Moszyński (1928), who noted that in Polesia *Glyceria* gathering was in some areas restricted to Polish settlers. However, there are other factors that may have boosted manna grass gathering synergistically. Firstly, increasingly large open areas of wet meadows were cleared, which may have increased the manna grass populations. Secondly, *Glyceria,* like other cereals, was a commodity easy to store and trade. Its name, relating to the Biblical manna, enhanced its attractiveness as a trade product. In spite of the fact that it was always time consuming to collect, it was very tasty. For both these reasons it was the most expensive cereal, and thus a suitable component of the obligatory tribute paid to landowners. Conditions for manna gathering may also have improved during the climatic cooling at the end of the Middle Ages. *Glyceria* was attractive to farmers because it matures at the end of June, about a month before the rye and wheat harvest, a time of the greatest cereal shortages. This famine food role of manna grass was pointed out by a few of Rostafiński's respondents, and subsequent bad harvest years were probably contributed to maintaining the tradition of manna grass gathering.

On the other hand, the use of manna grass could be a rare holdover from earlier times when it was practiced in the whole of northern Europe. This is supported by 480 caryopses from a middle pre-Roman Iron Age hearth at Spijkenisse, The Netherlands (Brinkkemper 1993; Behre 2008). Several other genera of grasses, nowadays neither cultivated nor gathered (e.g., *Bromus, Alopecurus, Stipa*) were also sometimes collected as food in Europe and Middle East from the Palaeolithic to the Bronze Age (e.g., Gluza 1984; Bieniek 2002; Weiss *et al.* 2004; Bieniek and Pokorný 2005).

Many of Rostafiński's respondents emphasized that the use of *Glyceria* was disappearing due to its time consuming collection. *Glyceria* was used mainly either as famine food or the food of aristocracy, and as agricultural yields increased, its use ceased altogether. The time consuming collection is reflected in the small amounts given as tribute, usually around 1 litre (Table 2). Thus a farm household was collecting on average 1 litre of manna for the landowner (and perhaps a few litres for themselves) throughout one season. This probably means that a few household members collected it for at least one day. If we assume that manna grass has a similar specific weight (0.7) and caloric value (2750–4190 kcal/kg) to primitive wheat species and wild edible grasses (Guðmundsson 1996) we can calculate that a person would have to consume at least 1 kg of manna grass a day, about 1.5 litres of grain. From preliminary experiments done by the first author (ŁŁ) it seems highly improbable that such an amount could be gathered in one day. Nineteenth century prices of manna indicate that the equivalent of at least 1–2 days labor may have been needed to collect 1 kg (Table 4). This low return for *Glyceria* gathering contrasts with the relatively high gathering efficiency of some wild harvested edible grasses at about 10 kg of grain a day (Chevalier 1932; Harlan 1989). However experiments concerning manna grass gathering are needed to estimate its real collecting efficiency.

The second reason for the cessation of manna use is the disappearance of wetlands. Throughout the nineteenth and twentieth century large drainage programs were implemented. From a dominant plant species in wetlands manna grass became a species of drainage ditches and marginal habitats which must have further decreased the efficiency of gathering. A few respondents to Rostafiński give this explanation. As Kluk (1781) wrote, manna was collected from hay meadows which were later cut. Manna grains are ready for harvest at the turn of June and July. Nowadays the first hay-making in Poland is done in early June, which may additionally hinder *Glyceria fluitans* from growing in hay meadows. The third reason, mentioned by one of Rostafiński's respondents from western Poland, was the ban on gathering manna introduced by landowners to protect meadows from being trampled before haymaking took place.

Inconsistencies in the Accounts

Despite the generally uniform picture of manna gathering presented in the sources cited, there remain a few inconsistencies. The main one is the reason why it is gathered in the morning. Duńczewski (1751), Kulczycki (1797), Jundziłł (1799), Wyżycki (1845) and one of Rostafiński's respondents explained that when the plants are dry, the grains fall too easily at the slightest movement. In Rostafiński's questionnaires one contradictory, probably mistaken, explanation that the spikelets shut also appears.

However, two of Rostafiński's informants gave a yet more plausible explanation—when the sieve was wet with dew, grains stuck to it and did not fall off when the collector was waving it through the meadow. Interestingly, gathering wild grass grains in the morning dew has also been reported from Northern Africa by Chevalier (1932). Only Szafer (1925) writes that manna grains were gathered in the afternoon, but his late, second-hand account is probably erroneous.

The second discrepancy is the season of gathering. Most respondents mention June, particularly the second half (Rzączyński 1721; Ładowski 1783; Jundziłł 1799; Rostafiński's letters), or early July (Zawacki 1616; Rzączyński 1721; Ładowski 1783; Jundziłł)—the average times of *Glyceria* ripening nowadays. Only Szafer (1925) writes about the end of July and Vautrin (1808) about May, but these are probably mistakes.

Szafer (1925) and Ciszewski (1925) both mention gathering not only manna grains but also a sweet secretion from the plants, a fact not mentioned by earlier sources. Two explanations are possible. One is that some people forgot that grains were collected and tried to somehow explain the memory of going to collect something in the morning in dew-covered meadows. Or perhaps the people who collected manna grains discovered that the secretion from the blades, or just the dew gathered on the plants, tastes good, and so made it into a drink.[3] Rostafiński (1900: 214) also speculated that some sort of "honey dew" may have been collected in Europe as manna, either the sweet aphid secretion falling from trees, nectar from some flowers (e.g., *Vicia* spp.), or sweet stinking excretions from rye infested with ergot, called Honigthau ('honey dew') in German.

Scope for Future Studies

Experiments are needed to measure the efficiency of the wild harvest of *Glyceria,* and on the chemical differences among the species in this genus. The density of information presented here is much higher for the present territory of Poland compared to Belarus, Lithuania and Ukraine, where ethnobotanical and archaeobotanical research is needed. An interesting project could also be the creation of a similar review for Germany to compare the manna gathering history in Poland and Germany—its two main producers.

Although the use of manna grass is well documented from Medieval times to the nineteenth century, the extent of the use of *Glyceria* in prehistory is still unclear. Also some technical details of its gathering (e.g., why it was gathered in the morning; how efficient the collection was) should be studied.

[3] Compare, for example, Native Americans gathering the sweet exudates of the reed *Phragmites australis* (Cav.)Steud (Moerman 1998).

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