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This article is dedicated to Professor Krystyna Wasylikowa, my teacher, expressing the highest respect and gratitude

Nettle in Polish archaeological sites

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ABSTRACT: The stinging nettle *Urtica dioica* L. and small nettle *U. urens* L. are wild herbaceous plants which commonly occur in the present-day flora of Poland. Nettle is an herb that has a long tradition of use for food and medicinal purposes. In Polish archaeological sites, macroscopic remains of nettles are neither frequent nor numerous, probably due to its collection just before the flowering season. Therefore, when it appears in a small number of fruits, it is usually interpreted as evidence of intentional use.

KEYWORDS: nettle, macroscopic plant remains, archaeobotany, Poland

INTRODUCTION

Nettle, despite a small beauty, is a commonly known plant. It is easily recognizable from childhood because of the itching and rash that it produces upon contact with the skin.

To the nettle genus *Urtica*, from the Urticaceae family, belong 33 species, including the stinging (common) nettle *Urtica dioica* L. and the small nettle *U. urens* L. (Zemanek 1999, p. 305, Szafer et al. 1986, p. 79). Both of these species occur in the present-day flora of Poland where they are wild herbaceous plants with the stinging nettle perennial and the small nettle an annual plant. While both species are common in Poland, *U. urens* is not found in the south- and north-eastern regions (A. Zając & M. Zając eds. 2001, p. 566).

The stinging nettle is a native plant occurring in natural habitats in humid forests and riparian thickets of willow-poplar and alder-ash. It is a species characteristic of the *Salicion albae* alliance that grows in sandy and gravel alluvia located in river valleys (Matuszkiewicz 2001, p. 142). It also develops well in fertile ruderal habitats and also in shady and marshy places (Mowszowicz 1986, p. 310, Matuszkiewicz 2001, p. 192).

The small nettle is an archaeophyte of Mediterranean-Subatlantic-Eurosyberian origin (Zając 1978). It grows in ruderal habitats mainly in association with *Urtico-Malvetum neglectae* from the *Sisymbrion officinalis* alliance (Matuszkiewicz 2001, p. 102). This community mostly appear in very nitrophilous habitats (Matuszkiewicz 2001, p. 185). *Urtica urens* is also a weed that occurs in domestic vegetable gardens. The small nettle requires a nitrogen and rich humus as well as weakly acidic or alkaline soil for growth (Medwecka-Kornaś et al. 1972, p. 284, Szafer et al. 1986, p. 79, Zarzycki et al. 2002).

ECONOMIC SIGNIFICANCE OF NETTLES

Information on the economic significance of nettles mainly relates to the common nettle, nevertheless, the small nettle can be used in a similar manner (Łuczaj 2004, p. 168). The utilitarian qualities of nettles result from the presence of many biologically active substances throughout the herb. In nettle leaves

there are, among others, glycolic, glycerol and formic acids, vitamins C, K, E, B2, flavonoids, tannins, phytosterols, histamine, mineral salts, and nutrients. This plant has hematopoietic properties due to the presence of iron. In the stinging hairs, called trichomes, acetylcholine, histamine, and formic acid appear. Also, the root contains some active substances (Ożarowski & Jaroniewski 1989, p. 302).

Nettles have been employed in ancient and medieval medicine. It was described, among others, by Hippocrates, Dioscorides and later by St. Hildegarda and Paracelsus (Nowiński 1983, p. 60). In folk medicine, the nettle was used for flogging naked body in a variety of chronic diseases (Nowiński 1983, p. 60), as well as rheumatism and paralysis (Henslowa 1962, p. 30). Rubbing the body proved to be stimulating in the case of "male impotence" (Kluk 1788, pp. 142, 143). Drinking fresh nettle juice contributed to the overall strengthening of the body (Kiljańska & Mojkowska 1988, p. 279). An infusion of leaves, tea or syrup made from fresh leaves and stems with sugar was drunk for the treatment of upper respiratory system diseases (Kuźniewski & Augustyn-Puziewicz 1986, p. 95, Tylkowa 1989, p. 54). Tea or syrup was also recommended for treating jaundice, asthma, tuberculosis, rheumatism, scurvy, and sore throat (Kluk 1788, pp. 132–133). An infusion of leaves is a specific remedy for excessive menstruation, pulmonary bleeding, and bloody diarrhea; it also helps to control and prevent hemorrhaging (Kuźniewski & Augustyn-Puziewicz 1986, pp. 147, 160). Herbal remedies made from nettle roots have also been a successful treatment for dissolving stones inside the body as e.g. kidney stone, cholelithiasis (Mikołajczyk & Wierzbicki 1983, p. 202). Wine extract from the seeds mixed with horseradish was recommended for the lubrication of pimples and skin rashes (Kuźniewski & Augustyn-Puziewicz 1986, p. 126). An alcoholic extract (a tincture) of the herb or tea of the leaves was directly applied to rheumatic pain areas and when ingested they were proved to have anticancer properties (Kuźniewski & Augustyn-Puziewicz 1986, pp. 139, 156). The nettle has also been used as an analgesic for toothache. In such cases, it was helpful to keep its fresh leaves in the mouth, to rinse with its decoction and to use as incense (Henslowa 1962, p. 30). Nettle seeds were regarded as poison or medicine, which excites "the spirits of life and marital affairs" and it also was used as a means of slimming (Kluk 1788, vol. III, pp. 142–143).

Nowadays nettles are used for medicinal purposes. In phytotherapy, extracts from the leaves are employed to treat urinary tract infections, rhinitis, gastroenteritis, kidney stones, rheumatic and skin diseases. Its decoction is given in cases of metabolism disorders. It is also recommended in the case of avitaminosis and anemia due to the high iron content. Nettle also reduces blood sugar levels. Nettle is part of many herbal preparations and mixtures (Ożarowski & Jaroniewski 1989, p. 303; Klimuszko 1989, pp. 111, 114, 117 and following).

Young plants can be used as vegetables (Nowiński 1983, p. 60, Henslowa 1962), whereas the leaves can be prepared like spinach and could have been an ingredient of herbal soups (Łuczaj 2004, p. 168, A. Lis & P. Lis 2009). Nettles have also been eaten during periods of hunger (Twarowska 1983, Łuczaj 2008), and dried and crashed nettles have been widely used for feeding farm animals (Podbielkowski 1985, p. 288).

Juice of leaves or decoction of the whole plant can be used for rennet to make dairy products and young leaves could be used for beer production (Łuczaj 2004, p. 168). Also, nettle juice has been utilized to obtain a bright green or yellow dye (Nowiński 1983, p. 60). Nettle stems contain a bast fibre that has been used for making cloth, ropes, and fishing nets. Textile fibre made from nettle is also occasionally encountered in Europe (Gale & Cutler 2000, p. 268).

The use of nettles in cosmetics has been fairly widespread. Various skin disorders and conditions are also effectively treated using herbal remedies derived from the nettle. For example, regeneration of hair growth. Mouthwashes and toothpastes containing this plant can reduce plaque and gingivitis. Nettle extract is used in shampoo and other hair tonics or lotions (Kuźniewski & Augustyn-Puziewicz 1986, p. 178, Kiljańska & Mojkowska 1988, p. 279).

PLANT REMAINS

Two kinds of remains are found in sub-fossil plant materials from Poland: pollen grains and fruits. Pollen grains are determined to

the generic level as *Urtica*. Its presence in the Holocene pollen spectra, according to Behre (1981), is one of the most important economic indicators of human activity. In this classification, nettles are considered among the group of weeds that have grown in ruderal and trampled places (Behre 1981, see also Latałowa 2003, pp. 279–280).

Macroscopic plant remains from archaeological sites have been indentified to the species level (Tab. 1). Fruit of the stinging nettle (*Urtica dioica*) have been found in 29 archaeological sites. The oldest remains come from the Mesolithic levels at the Tłokowo site (Schild et al. 2003). Other older remains found in the archaeological sites dated to the Bronze Age, the Hallstatt Period and Roman Iron Age. However, the nettle was more frequent in the Early and the Late Medieval periods. Plant remains have been found preserved in charred and uncharred conditions. The number of specimens varies among individual sites, from single to relatively numerous ocurrences, as noticed at Pieczarki (Polcyn 2000), Kraków-Wawel Hill (Wasylikowa 1978), Wolin, site I (Latałowa 1999), and Września (Latałowa 1998).

On the other hand, the small nettle (*Urtica urens*) has been rarely recorded. It was only discovered in archeological materials dated to the Early Medieval Period. Its fruit, preserved as charred and uncharred specimens, appeared in only six sites. The most numerous assemblages were found at the Wawel Hill in Kraków (Wasylikowa 1978).

Table 1. Fruit of *Urtica dioica* and *U. urens* from archaeological sites in Poland. Explanations: Number of fruit are given. State of preservations: **ch** – charred, **uch** – uncharred; **?** – unknown number or state of preservations

Chronology /culture	**Site**	***Urtica dioica***	***Urtica urens***
Mesolithic	Tłokowo	ch (Schild et al. 2003)	
Bronze Age, Trzciniec culture	Słonowice site G	6 unch (Lityńska-Zając unpubl.)	
Hallstat Period, Lusatian culture	Biskupin	6 uch (Jaroń 1938)	
	Grzybiany site 1	1 ch (Klichowska 1984)	
Hallstat Period, West Baltic Barrow culture	Pieczarki	377 uch (Polcyn 2000)	
Late Pre-Roman Iron Age	Tczew	55 uch (Badura 2005)	
Roman Period, Przeworsk culture	Jakuszowice site 2	1 ch (Lityńska-Zając 2005)	
	Otalążka	13 uch (Madeyska 1984)	
Roman Period	Paprotki Kolonia site 41	3 ch (Pirożnikow 2002)	
Early Medieval Period	Gniezno site 22	22 uch (Koszałka 2000)	
	Gniezno site?		6 uch (Jaroń 1939)
	Kraków, pl. Wita Stwosza	1 ch (Jedliczka 1965)	1 ch (Jedliczka 1965)
	Kraków, Market Squer	13 uch (Wieserowa 1979)	1 uch (Wieserowa 1979)
	Kraków, Wawel Hill	4 ch, 1689 uch (Wasylikowa 1978)	56 uch (Wasylikowa 1978)
	Parchatka site 1	2 ch (Lityńska-Zając 1995)	
	Poznań, Ostrów Tumski	uch (Moldenhawer 1939)	
	Przemyśl	1 ch (Wieserowa 1967)	
	Santok	? (Baas 1936)	
	Wolin site I	242 uch (Latałowa 1999)	11 uch (Latałowa 1999)
	Wolin site 8	10 uch (Alsleben 1995)	8 ch (Alsleben 1995)
	Września site 7	183 uch (Latałowa 1998)	
Late Medieval Period	Elbląg	? (Latałowa et al. 2003)	
	Kołobrzeg, Ratuszowa street	21 uch (Latałowa & Badura 1996)	
	Kołobrzeg, Gierczak street	13 uch (Badura 1998)	
	Kołobrzeg, Katedralna street	2 uch (Badura 1999)	
	Kołobrzeg, Armii Krajowej street	99 uch (Badura 1999)	
	Kraków, Ratusz	? uch (Wasylikowa 1965)	
	Kraków, Market Squer	25 uch (Wieserowa 1979)	
15th	Łekno	65 ch (Strzelczyk 2003)	
18th	Kraków, Stara Bożnica	13 uch (Tomczyńska & Wasylikowa 1999)	

DISCUSSION AND CONCLUSIONS

In sub-fossil plant materials obtained from archaeological sites, fruit and seeds were usually preserved. They have different possibilities of deposition and preservation in the sediments to the present day. These results consider on one hand the habitats where the plants grew, the structure of the diaspores themselves and how they are spread, and on the other hand, the use of the plants in ancient times and especially the methods associated with food preparation.

In archaeobotany, there is an assumption that the occurrence of higher number of concentrated diasporas of a particular species, which nowadays is considered to have some utilitarian characteristics, is a direct confirmation of its use. In other cases, it is only possible to use a method of inference in which our knowledge may indicate the potential qualities of a particular plant. On this basis we can assume that the nettle was known to early human groups and it was used by them. This is confirmed by historical and ethnographical data presented in this paper.

At the present time nettles are widespread in the human environment. It is a high yielding plant, as one plant of *Urtica dioica* produces about 100 000 fruits (Tymrakiewicz 1962, p. 31). Nevertheless, at archaeological sites in Poland, the remains of nettle are infrequent and when encountered are not very numerous. In the cultural layers, a small number of fruits may be caused by the way in which nettles were used for food preparation and for medicinal purposes – mainly young plants were normally collected, probably even before flowering and yielding diasporas. The interpretation of the context of the findings, such as deposition of diasporas in archaeological features and layers is also very important. This context suggests that the uncharred specimens of nettles, especially those derived from early medieval hill forts, may have come from growing places in ruderal habitats located in the surroundings of man. These habitats were probably rich in nitrogen. Indirectly, it may be concluded that the nettle occurred near areas inhabited by man and was readily available and used.

Charred and uncharred nettle remains have been found in individual samples containing numerous grains of cereals or seeds of other cultivated plants. In some of these cases, they are considered vegetal weeds, brought from fields together with the grains to the storage sites (Lityńska-Zając 2005, p. 130). The remains of *Urtica dioica* were preserved in two samples of millet *Panicum miliaceum* at Wolin, site 8 (Alsleben 1995) as well as in one sample of rye *Secale cereale* at Parchatka, site 12 (Lityńska-Zając 1995) and wheat club *Triticum aestivum* at Przemyśl on the Castle Hill (Wieserowa 1967). In addition, in two instances they have been preserved in flax *Linum ussitatisimum* samples at Września, site 7 (Latałowa 1998) and from Wolin, site 8 (Alsleben 1995).

In the past, this species probably occurred primarily in natural habitats, but in younger periods it colonized ruderal places. Perhaps the nettle was a weed which grew in cereals and flax fields (Lityńska-Zając 2005, p. 130).

Diasporas of small nettle occurred in one sample of rye *Secale cereale* at Wolin, site 8 (Alsleben 1995). This particular occurrence of the small nettle does not allow a clear assessment about whether it grew as a weed in rye fields (Lityńska-Zając 2005, p. 76).

REFERENCES

ALSLEBEN A. 1995. Nutzpflanzen aus dem mittelalterlichen Wolin. Zwei ausgewählte Gruppen: Getreide und Lein. Offa, 52: 185–217.

BAAS J. 1936. Die Pflanzenwelt in den fünf ältesten Burgen von Zantoch. Zantoch, eine Burg im Deutschen Osten, Leipzig. p. 122–128.

BADURA M. 1998. Szczątki botaniczne ze szczególnym uwzględnieniem roślin użytkowych. (summary: Botanische Überreste unter besonderer Berücksichtigung der Nutzpflanzen): 319–336. In: Rębkowski M. (ed.), Archeologia średniowiecznego Kołobrzegu, III.

BADURA M. 1999. Szczątki roślinne – analiza botaniczna warstw kulturowych. (summary: Pflanzliche Überreste – die archäobotanische Analyse der Kulturschichten): 323–349. In: Rębkowski M. (ed.), Archeologia średniowiecznego Kołobrzegu, IV.

BADURA M. 2005. Szczątki roślinne z osady z młodszego okresu przedrzymskiego w Tczewie (summary: Pflanzenreste aus einer Siedlung der jüngeren Zeit in Tczew (Dirschau). XIV Sesja Pomorzoznawcza, Muzeum Archeologiczne, Gdańsk 19–21. 11. 2003. 371–380.

BEHRE K.-E. 1981. The interpretation of anthropogenic indicators in pollen diagrams. Pollen et Spores, 23(2): 225–245.

GALE R. & CUTLER D. 2000. Plants in Archaeology. Identification manual of artefacts of plant origin from Europe and the southern Mediterranean

can to ca 1500. Wertbury and Royal Botanic Garden, Kew.

HENSLOWA M. 1962. Rośliny dziko rosnące w kulturze ludu polskiego. Archiwum Etnograficzne, 25.

JAROŃ B. 1938. Szczątki roślinne z wczesnego okresu żelaznego w Biskupinie –Wielkopolska (summary: Les trouvailles botaniques de la cité „lusacienne" du premier âge du fer à Biskupin). Gród prasłowiański w Biskupinie: 1–30.

JAROŃ B. 1939. Średniowieczne szczątki roślinne z wykopalisk w Gnieźnie (summary: Tourbière avec les restes d'un village fortifiée de la civilisation lusacienne à Biskupin (Compte-rendu provisoire)). In: Kostrzewski J. (ed.), Gniezno w zaraniu dziejów (od VIII do XIII wieku) w świetle wykopalisk. Bibl. Prehist., 4: 273–316.

JEDLICZKA A. 1965. Wczesnośredniowieczne szczątki roślinne z wykopalisk na Placu Wita Stwosza w Krakowie (summary: Early Medieval plant remains from the excavations of the Wit Stwosz Place in Cracow). Mater. Archeol., 6: 181–182.

KILJAŃSKA I. & MOJKOWSKA H. 1988. Zielnik Polski. Interpress. Warszawa.

KLICHOWSKA M. 1984. Struktury uprawne w epoce brązu i we wczesnej epoce żelaza na ziemiach polskich w świetle badań archeobotanicznych (summary: Cultivation structures in the Bronze Age and the Early Iron Age in Poland in the light of archaeobotanical researches). Archeol. Polski, 29(1): 69–108.

KLIMUSZKO A. C. 1989. Wróćmy do ziół. Instytut Pracy i Wydawnictw Novum, Warszawa.

KLUK K. 1788. Dykcyonarz roślinny w którym podług układu Linneusza są opisane rośliny nie tylko krajowe dzikie, pożyteczne, albo szkodliwe. Drukarnia Xięży Piarów, Warszawa, vol. III.

KOSZAŁKA J. 2000. Makroskopowe znaleziska roślinne z wczesnośredniowiecznych warstw kulturowych i osadów jeziornych w Gnieźnie rdzeń GN 22/XIII i SW 3/91 (Zusammenfassung: Die Makroskopische Pflanzenfunde aus frühmittelalterlichen Kulturschichten und Seeablagerung in Gnesen. Kerne GN 22/XII und SW 3/91). Studia Lednickie, 6: 389–416.

KUŹNIEWSKI E. & AUGUSTYN-PUZIEWICZ J. 1986. Przewodnik ziołolecznictwa ludowego, PWN, Warszawa.

LATAŁOWA M. 1998. Botanical analysis of a bundle of flax (*Linum usitatissimum* L.) from an early medieval site in northern Poland; a contribution to the history of flax cultivation and its field weeds. Veget. Hist. Archaeobot., 7: 97–107.

LATAŁOWA M. 1999. Palaeoecological reconstruction of environmental conditions and economy in early medieval Wolin. Acta Palaeobot., 39: 183–271.

LATAŁOWA M. 2003. Holocen: 273–307. In: Dybova-Jachowicz S., Sadowska A. (eds.), Palinologia. Instytut Botaniki im. W. Szafera PAN, Kraków.

LATAŁOWA M. & BADURA M. 1996. Szczątki roślinne (Zusammenfassung: Pflanzliche Überreste): 385–415. In: Rębkowski M. (ed.), Archeologia średniowiecznego Kołobrzegu, I.

LATAŁOWA M., BADURA M. & JAROSIŃSKA J. 2003. Archaeobotanical samples from non-specific urban contexts as a tool for reconstructing environmental conditions (examples from Elbląg and Kołobrzeg, northern Poland). Veget. Hist. Archaeobot., 12: 93–104.

LIS H. & LIS P. 2009. Kuchnia Słowian. O żywności, potrawach i nie tylko… Libron, Kraków.

LITYŃSKA-ZAJĄC M. 1995. Charakterystyka niektórych aspektów upraw na podstawie analizy szczątków roślinnych ze stanowiska 12 w Parchatce gm. Kazimierz Dolny, woj. lubelskie (summary: Characteristic of aspects of cultivation on the ground of analysis of plant remains from the site 12 at Parchatka, Kazimierz Dolny commune, Lublin province). Spraw. Archeol., 47: 255–263.

LITYŃSKA-ZAJĄC M. 2005. Chwasty w uprawach roślinnych w pradziejach i wczesnym średniowieczu (summary: Segetal weeds in Prehistoric and Early Medieval farming). Instytut Archeologii i Etnologii PAN, Kraków.

ŁUCZAJ Ł. 2004. Dzikie rośliny jadalne Polski. Przewodnik survivalowy. Chemigrafia, Krosno.

ŁUCZAJ Ł. 2008. Dzikie rośliny jadalne używane w okresach niedoboru żywności we wschodniej części Karpat (powiaty Krosno, Sanok, Lesko, Nadwórna, Kosów, Kołomyja) według ankiety szkolnej z 1934 roku (summary: Wild edible plants eaten Turing food shortages in the eastern Carpathians (Krosno, Sanok, Lesko, Nadwórna, Kosów and Kołomyja regions): an ethnobotanical analysis of a 1934 school questionnaire). In: Łuczaj Ł. (ed.), Dzikie rośliny jadalne – zapomniany potencjał przyrody. Arboterum Bolestraszyce, 11: 161–181.

MADEYSKA E. 1984. Owoce i nasiona późnorzymskiego stanowiska archeologicznego w Otalążce nad rzeką Mogielanką, woj. radomskie (summary: Fruits and seeds from the Late Roman archaeological site at Otalążka, in the Mogielanka River, Radom district). Acta Palaeobot., 24(1/2): 67–80.

MATUSZKIEWICZ W. 2001. Przewodnik do oznaczania zbiorowisk roślinnych Polski, Faliński J.B. (ed.), Vademecum Geobotanicum 3, Warszawa.

MEDWECKA-KORNAŚ A., KORNAŚ J., PAWŁOWSKI B. & ZARZYCKI K. 1972. Przegląd ważniejszych zespołów roślinnych Polski: 279–382. In: Szafer W. & Zarzycki K. (eds), Szata roślinna Polski vol. 1.

MIKOŁAJCZYK K. & WIERZBICKI A. 1983. Zioła. Ludowa Spółdzielnia Wydawnicza, Warszawa.

MOLDENHAWER K. 1939. Szczątki roślinne z X wieku z wykopalisk na Ostrowie Tumskim w Poznaniu (summary: Les débris de plantes du X éme siecle provenant des foulles de l'enceinte polonaise de Poznań). Przegl. Archeol., 6(2–3): 222–231.

MOWSZOWICZ J. 1986. Pospolite rośliny naczyniowe Polski. PWN, Warszawa.

NOWIŃSKI M. 1983. Dzieje upraw i roślin leczniczych. PWRiL, Warszawa.

OŻAROWSKI A. & JARONIEWSKI W. 1989. Rośliny lecznicze i ich praktyczne zastosowanie. Instytut Wydawniczy Związków Zawodowych, Warszawa.

PIROŻNIKOW E. 2002. Rekonstrukcja obrazu roślinności naturalnej i antropogenicznej na podstawie analizy szczątków makroskopowych ze stanowiska 41 w Paprotkach Kolonii, gm. Miłki, pow. Giżycko. (Zusammenfassung: Rekonstruktion des Bildes der ntürlichen and antropogenischen Vegetation auf Grundlage der Analyse von makroskopischen Rudimenten vom Fundstelle 41 in Paprotki Kolonia, Gemeinde Miłki, Kreis Giżycko): 23–54. In: Karczewska M., Karczewski M., Pirożnikow E. (eds), Osada z okresu wpływów rzymskich i okresu wędrówek ludów w Paprotkach Kolonii stanowisko 41 w Krainie Wielkich Jezior Mazurskich. vol. 2. Analizy paleoekologiczne.

PODBIELKOWSKI Z. 1985. Słownik roślin użytkowych, PWRiL, Warszawa.

POLCYN M. 1998. Archeobotaniczna interpretacja podwodnych warstw kulturowych dwóch akwenów w środkowej Wielkopolsce. Msc. PhD.

POLCYN M. 2000. Archaeobotanical finds from the West Baltic Barrow Culture Lake Dwelling in Pieczarki (Great Masurian Lakeland). An Attempt at the Reconstruction of Plant Economy. Studies in Lake Dwellings of the West Baltic Barrow Culture. 131–190.

SCHILD R., TOBOLSKI K., KUBIAK L., EICHER U. & CALDERONI G. 2003. Hervesting pike at Tłokowo: 149–155. In: Larsson L. (ed.), Mesolithic on the Move.

STRZELCZYK J.E. 2003. Makroszczątki roślinne ze stanowiska nr 3 w Łeknie-Klasztorek. Badania z lat 2001–2002 (summary: Botanical macroremains from Łekno. Research conducted in years 2001 and 2002). Studia i materiały do dziejów Pałuk, 4: 203–212.

SZAFER W., KULCZYŃSKI S. & PAWŁOWSKI B. 1986. Rośliny Polskie. vol. 1. PWN, Warszawa.

TOMCZYŃSKA Z. & WASYLIKOWA K. 1999. Rośliny znalezione w 16-wiecznej latrynie w Krakowie (summary: Plants found in a 16th century cesspit in Kraków). Pol. Bot. Stud. Guidebook Series, 23: 279–316.

TWAROWSKA E. 1983. Zdobywanie pożywienia (zbieractwo wczesnośredniowieczne w Polsce): 218–231. In: Kozłowski J.K. & Kozłowski S.K. (eds), Człowiek i środowisko w pradziejach. PWN, Warszawa.

TYLKOWA D. 1989. Medycyna ludowa w kulturze wsi Karpat polskich (summary: Folk medicine in the culture of the Carpathians countryside tradition and present day). Instytut Historii Kultury Materialnej PAN, Warszawa.

TYMRAKIEWICZ W. 1962. Atlas chwastów. PWRiL, Warszawa.

WASYLIKOWA K. 1965. Makroskopowe szczątki roślin znalezione w warstwie średniowiecznej na Rynku Głównym w Krakowie (summary: Macroscopic plant remains found in the medieval laser from the Rynek Główny – Main Market Place – in Cracow). Mater. Archeol., 6: 191–196,

WASYLIKOWA K. 1978. Plant remains from Early and Late Medieval time found on the Wawel Hill in Cracow. Acta Palaeobot., 19: 115–200.

WIESEROWA A. 1967. Wczesnośredniowieczne szczątki zbóż i chwastów z Przemyśla (summary: Early Medieval remains of cereals and Leeds from Przemyśl, SE Poland). Folia Quatern., 28: 1–16.

WIESEROWA A.1979. Plant remains from Early and Late Middle Ages found in settlement layers of the Main Market Square in Cracow. Acta Palaeobot., 20(2): 137–212.

ZAJĄC A. 1978. Pochodzenie archeofitów występujących w Polsce (summary: The origin of the archaeophytes occuring in Poland). Rozprawy habilitacyjne Uniwersytetu Jagiellońskiego, 29: 3–213.

ZAJĄC A. & ZAJĄC M. (eds.) 2001. Atlas rozmieszczenia roślin naczyniowych w Polsce (summary: Distribution atlas of vascular plants in Poland). Pracownia Chorologii Komputerowej Instytutu Botaniki UJ, Kraków.

ZARZYCKI K., TRZCIŃSKA-TACIK H., RÓŻAŃSKI W., SZELĄG Z., WOŁEK J. & KORZENIAK U. 2002. Ecological indicator of vascular plants of Poland: 7–183. In: Mirek Z. (ed.), Biodiversity of Poland. W. Szafer Institute of Botany, Polish Academy of Sciences, Kraków.

ZEMANEK B. 1999. Pokrzywa. Encyklopedia Biologiczna. Vol. VIII, p. 305. Opres. Kraków.