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The association *Geranio phaei-Urticetum dioicae* Hadač *et al.* (1969) in Central Pomerania

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Abstract: *Geranio phaei-Urticetum dioicae*, a poorly known association of nitrophilous outskirts communities was characterized based on 16 phytosociological relevés. Its ecological requirements and distribution in Pomerania and Poland are presented. A new subassociations of the *Geranio phaei-Urticetum dioicae allietosum ursini* have been distinguished on the basis of differing species composition. Edaphic and phytocenotic conditions of the population were specified. Association is found in mineral soil of acid reaction abundant with nitrogen and phosphorus, and as to its quantity it belongs to less numerous ones at Pomerania.

Key words: *Geranium phaeum*, nitrophilous outskirts communities, *Convolvuletalia sepium*, Central Pomerania

1. Introduction

The general distribution of *Geranio phaei-Urticetum dioicae* is not yet identified. *Geranium phaeum* is diagnostic species of the association with Alpic-Central-European distributional type, occurs in mountain and submontane areas of Europe (Zając & Zając 2009). In Central Europe this plant association has been recorded rarely. It was described in the Belianské Tatra Montains (Hadač *et al*. 1969). In the first description of the association Author's included it in the class *Rudero-Secalietea* Br.-Bl. 1936, order *Onopordetalia acanthii* Br.-Bl. & R.Tx. 1943 and alliance *Carduo-Urticion dioicae* Hadač 1962. This alliance, in his opinion, contained nitrophilous saum communities developing on calcareous soils. The association was reported as quite common in the Austrian Alps and their foothills, especially on calcareous substratum (Mucina 1993). Brzeg (1989) located *Geranio phaei-Urticetum dioicae* in the class *Artemisietea vulgaris* Lohmeyer, Preising & R. Tx. in R. Tx. 1950, order *Galio-Calystegalia sepium* (R. Tx. 1950) Oberd. 1967, alliance *Aegopodion podagrariae* R. Tx. 1967 and suballiance *Melandrio-Aegopodienion* (R. Tx. 1967) Siss. 1973. According to Ratyńska *et al*. (2010) the syntaxonomic position of the *Geranio phaei-Urticetum dioicae* Hadač *et al.* 1969 is a follow: class *Artemisieta vulgaris* Lohmeyer *et al.* in R. Tx. 1950, order *Convolvuletalia sepium* R. Tx. 1950 ex Lohmeyer 1953 em Oberd. in Oberd. *et al.* 1967, alliance *Petasition officinalis* Silinger 1933.

In Poland, the population of *Geranium phaeum* was numerous in the past times in the Carpathian and Sudety foreland, in north Małopolska and Lublin Highlands with isolated localities on lowlands (north Poland) (Zając 1996). In Central Pomerania, whose borders are marked conventionally by the River Łeba in the East and the River Parsęta in the West (according to Kondracki 2004) it is an eastern part of Western Pomerania. *Geranium phaeum* is found at the former manor-park complexes in Boleszewo and Osieki Koszalińskie (Fig. 1). *Geranium phaeum* stands are situated within the ATPOL grid – (Boleszewo BA87, Osieki Koszalińskie BA94) following the principles adopted for the "Atlas of the Distribution of the Vascular Plants in Poland" (Zając 1978). Boleszewo is a small village within the premises of Sławno Commune and Osieki Koszalińskie the premises of Sianów Commune in Pomeranian Province. According to a geobotanical division of Poland (Matuszkiewicz 1993), the villages belonging to the Słupsk Region included within the area of the Southern Baltic Coastland and Pomeranian Divide. According to a physical-geographical division of Poland (Kondracki 2004), Boleszewo is situated within the mesoregion of the Sławno Plain and Osieki Koszalińskie – Słowińskie Coast.

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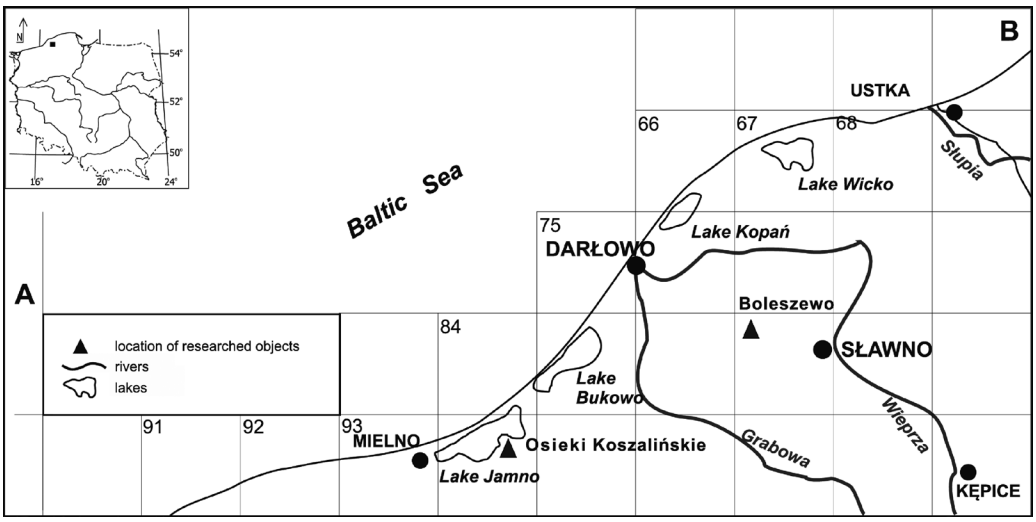

Fig. 1. Distribution of *Geranium phaeum* in the ATPOL grid of the Central Pomerania

The paper contains distribution, habitat conditions and phytosociological characteristics of the community *Geranio phaei-Urticetum dioicae* Hadač *et al*. (1969).

2. Material and methods

The studies of chorology of saum communities of selected midfield biotopes with participation of *Geranium phaeum* were carried at the Słowińskie Coast and Sławno Plain in the years 2011-2014. 16 phytosociological relevés were taken with application of Braun-Blanqueta method. The classification and nomenclature of syntaxa was adopted after Ratyńska *et al*. (2010), the nomenclature of the vascular plants after Mirek *et al*. (2002) and bryophyta with the list of Ochyra *et al.* (2003).

All relevés were recorded in TURBOVEG data base, and subsequently were grouped, making introductory evaluation of similarities by means of TWINSPAN software (Hennekens & Schaminée 2001). The set of 16 was analyzed to the 6th level after previous transformation of 7 degree Braun-Blanquet scale into the order scale, adopting the following values: r-1, +-2, 1-3, 2-5, 3-7, 4-8, 5-9. Phytosiociological relevés are classified by means of NCLAS software from SYNTAX 5.0 package (Podani 1993). Similarities between the relevés were calculated by means of Jaccard formula on a basis of presence or lack of compared species (Fig. 2).

The soil samples were taken from the layer of rhizosphere in direct vicinity of the root system of the examined plants, in order to establish chemical composition of the soil. The following characteristic features of the soil were determined: active acidity (pH_{H20}) and exchangeable acidity (pH_{KCl}) by means of the potentiometric, total nitrogen – by the Kjeldahl's method, organic carbon – by the Tiurin's method (Bednarek *et*

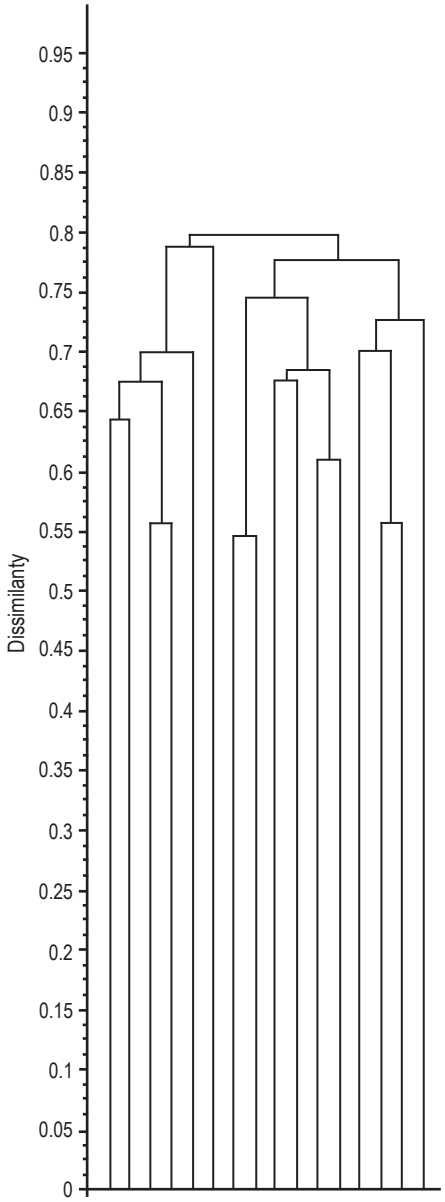

Fig. 2. Classification of *Geranio phaei-Urticetum dioicae* based on species composition in accordance with Jaccard's formula using the NCLAS program

Table 2. Chemical parameters of soil

Locality	pH		Humus (%)	C (%)	N (%)	P (%)	C/N	C/P	N/P
	H_2O	KCl							
Boleszewo	5.41	3.83	5.81	3.45	0.36	0.0198	13.87	190.50	14.45
Osieki Koszalińskie	5.15	3.64	5.67	3.27	0.27	0.0172	13.48	190.30	14.31

al. 2005), total phosphorus – by the molybdate method (Nowosielski 1974). In addition, the organic matter content in the examined substratum was determined.

3. Results

The phytosociological documentation of *Geranio phaei-Urticetum dioicae* phytocoenoses found in the 2 recorded localities consists of 16 relevés (Table 1 – see page 00). 61 taxons in total were discovered in the community. In particular patches, there were from 16 to 25 species (average 21). The tree stand of the analyzed phytocenoses is dominated by *Acer pseudoplatanus* and *Fraxinus excelsior.* The layer of bushes is well developed. One can find *Corylus avellana* and *Quercus robur* in it. Attention is drawn by *Sambucus nigra* (III class of stability) – a taxon characteristic for *Sambuco-Salicion* relationship. Elder is indicator of anthropogenic communities of a high level of euthrophication of the soil (Wojterska 1990). The undergrowth is dominated by taxons of both syngenetic groups: *Querco-Fagetea* Br.-Bl. et Vlieg. 1937 and *Fagetalia sylvaticae* Pawł. in Pawł., Sokoł. et Wall 1928. This type is distinguished as the subassociation *Geranio phaei-Urticetum dioicae allietosum ursini*. Differential species are: *Allium ursinum, Sanicula europaea* and *Asarum europaeum.* A visible early spring aspect is a vital characteristic feature of the phytocenoses (relevés 3, 7, 11, 15), which falls for the brink of May. The following geophytes constitute physiognomy of the early spring patches: *Anemone nemorosa* and *Ficaria verna.* The early spring plants quickly yield to summer aspect species, of which: *Poa nemoralis* (V), and *Aegopodium podagraria* (V). In addition to the above mentioned *Sambucus nigra*, the presence of *Artemisia vulgaris, Urtica dioica, Glechoma hederacea* and *Alliaria petiolata* can indicate synanthropization of the analysed patches of the *Geranio phaei-Urticetum dioicae.* A numerous group (20 species) comprises accompanying and sporadic species (occuring only in I constancy class), of which the legally protected: *Epipactis helleborine* and *Hedera helix.* The moss layer is poorly developed. Only *Plagiomnium undulatum* is worth mentioning, which appeared in the III stability class with a relatively high coverage ratio (relevés 6-10). Participation of *Atrichum undulatum* – moss characteristic for *Querco-Fagetea*, is scarce.

The soil examination showed its acidic reaction (pH=3.64-3.83), and it is quite well supplied with nitrogen, and a small quantity of the organic matter indicates that it is a mineral soil. Narrow relation of C/N (13.48-13.87) represents good soil efficiency and good quality of the biotope, and the soil is sufficiently abundant with phosphorus (Table 2).

4. Discussion

The occurrence of this association, described as a community with *Geranium phaeum* was reported in the Polish part of the Tatra Mountains by Balcerkiewicz (1978) and then by Brzeg (1989). The first relevés of the association from the Góry Stołowe Mountains were made by Pender and Macicka-Pawlik (1996), who distinguished a 'community with *Urtica dioica*'. A similar 'community with *Geranium phaeum*' is known from Trzebnickie Hills (Pender & Rybałtowska 1995). Świerkosz *et al.* (2002) reported the occurrence of the association in the southwest Poland. Five new subassociations of the *Geranio phaei-Urticetum dioicae* (*G.-U. arrhenatheretosum elatioris*, *G.-U. typicum*, *G.-U. festucetosum giganteae*, *G.-U. senecionetosum fuchsii* and *G.-U. rumicetosum alpestris*) have been distinguished on the basis of differing species composition.

The known range of the association is generally limited to mountain and submontane regions of Central Europe (the Tatras, Sudety Mountains and their foothills), with isolated localities on lowland - in northern Poland (Pomerania). In Poland it can be excepted mainly along the Carpathian-Sudetic arc and in adjacent areas (Zając 1996). Subassociation *Geranio phaei-Urticetum dioicae allietosum ursini* in Central Pomerania is new for Poland.

Table 1. *Geranio phaei-Urticetum dioicae* Hadač *et al.* 1969 *allietosum ursini* Sobisz 2014 *subass. nova.* Nomenclature type: table 1 rel. 15 (orig.) holotypus hoc loco (Hadač *et al.* 1969; 215-217)

Successive number of phytosociological relevé	1	2	3	4	5	6	7	8	9	10	11
Phytosociological relevé area [m^2]	15	12	12	10	15	10	15	10	10	20	12
Date (day, month, year)	12.05 . 2011	19.06 . 2014	25.05 . 2014	12.06 . 2013	18.06 . 2011	19.06 . 2014	12.05 . 2011	25.05 . 2014	29.06 . 2013	29.06 . 2012	25.05 . 2014
Locality	OsK	Bo	Bo	Bo	Bo	OsK	OsK	OsK	OsK	OsK	OsK
Soil (mechanical compsition of A horison – 0-20 cm)	org	org	org	pgm	org	org	hbb	org	org	org	pgm
Density of shrub layer [%]	5	5	5	10	5	.	2	.	2	2	2
Coverage of herb layer [%]	90	70	100	95	80	90	100	95	90	100	95
Coverage of moos layer [%]	5	.	5	5	.	10	10	5	15	15	5
Number of species in phytosociological relevé	21	21	18	19	20	21	23	19	21	22	24
Ch. *D Ass. *Geranio phaei-Urticetum dioicae*											
Geranium phaeum	3.3	1.2	+.2	1.2	2.2	2.2	1.2	1.1	3.3	2.2	1.1
**Melandrium rubrum*	+	1.1	·	.	.	1.2	1.2	.	.	1.2	+
**Ranunculus lanuginosus*	1.2	·	.	.	1.2	.	.	.	+	.	.
ChAss. *Geranio phaei-Urticetum dioicae allietosum ursini*											
Allium ursinum	2.3	3.3	5.5	4.5	3.3	3.4	4.4	4.4	2.2	3.3	4.4
Sanicula europaea	+	·	·	.	.	+	+	.	.	1.1	+
Asarum europaeum	·	1.1	·	.	+.2	·	.	.	·	.	.
I. ChO. *Convolvuletalia sepium*, ChAll. *Petasition officinalis*											
Aegopodium podagraria	1.2	+	.	1.1	1.1	1.1	+	1.1	+	1.2	+
Anthriscus sylvestris	1.1	.	+.2	1.1	.	.	.	1.2	.	.	.
Galium aparine	.	.	+.2	.	.	.	1.2	.	.	+.2	.
Heracleum sphondylium	.	+	+	.		·	+	.	+	.	+
Alliaria petiolata	.	+	·	1.1	+	.	+	+	·	+	·
Geranium robertianum	.	.	·	1.2	.	1.1	.	·	·	+	·
Glechoma hederacea	.	.	.	·	+	.	+	·	·	.	·
Viola odorata	.	.	.	.	.	+	.	.	+	.	+
II. ChCl. *Artemisietea vulgaris*											
Urtica dioica	1.1	1.2	+	1.1	1.2	1.1	2.2	2.2	1.2	1.2	1.2
Artemisia vulgaris	1.1	+	1.1	.	+	·	.	+	+	1.1	+
Myosoton aquaticum	1.1	.	+	.	+	.	+	.	+	.	.
Equisetum arvense	.	+.2	.	·	.	.	+.2	.	.	+	.
Cirsium arvense	+	·	.	+	·	·	.	·	.	.	·
Melandrium album	·	+	·	·	.	.	.	+	·	+	+
III. ChCl. *Querco-Fagetea*											
Poa nemoralis	1.2	.	+	+.2	+	+..2	+	+.2	+.2	1.1	1.2
Galeobdolon luteum	+	.	+	.	.	+	1.1	+	+	+	·
Acer pseudoplatanus b	1.2	1.2	1.2	.	1.2	+	.	+	+	.	+
Polygonatum multiflorum	.	+	+	.	+	+.2	.	1.2	.	·	.
Fraxinus excelsior b	+.2	.	·	1.1	·	.	.	.	1.1	.	+
Stachys sylvatica	.	+	·	·	1.1	·	.	.		1.1	.
Milium effusum	.	.	.	.	.	.	+	1.1	.	.	+
Ficaria verna	.	.	1.1	+	.	.	1.1	.	.	.	1.2
Anemone nemorosa	.	.	+	.	.	.	1.2	+	.	.	+
Corylus avellana	.	.	·	1.1	.	+	.	·	·	+	·
IV. ChCl. *Molinio-Arrhenatheretea*, ChO. *Arrhenatheretalia*											
Ranunculus repens	1.2	1.2	+	+	1.2	1.2	1.2	.	+	+.2	+
Poa trivialis	.	1.1	.	+	.	.	.	+	+	1.2	+
Veronica chamaedrys	.	+	.	.	+	.	+	.	1.1	.	1.2
Poa pratensis	.	+	.	·	.	·	.	.	.	+.2	1.1
Epilobium palustre	.	.	+.2	+	·	1.1	.	·	·	.	·
Dactylis glomerata	.	.	+	.	.	.	.	.	+	.	+
Taraxacum officinale	.	.	.	.	.	.	+	·	·	.	·
V. Accompanying species											
Sambucus nigra	+	+	.	.	+	.	+	.	+	.	+
Plagiomnium undulatum	.	.	.	.	.	1.2	1.2	1.2	2.2	2.2	1.2
Quercus robur b	.	+	.	.	.	.	+	.	+	.	+

Species occurring only in I constancy class: I. *Calystegia sepium* 1 (+), *Geum urbanum* 9 (+), *Impatiens parviflora* 4 (+), 7 (1.1), 9 (+), *Lamium maculatum* 8, 15 (+); **III.** *Atrichum undulatum* 3, 6, 13 (1.2), *Epipactis helleborine* 6 (+), *Hedera helix* 14 (+), **IV.** *Galium mollugo* 10, 12 (1.1), *Poa pratensis* 8, 11 (+.2), *Ranunculus acris* 14, 16 (+), *Rumex acetosa* 4, 15 (+), 13 (1.1), *Sympytum officinale* 5 (+), **V.** *Mentha arvensis* 1 (+), *Mnium hornum* 1, 4, 16 (1.2), *Scutellaria galericulata* 2, 5 (+)

Explanation: locality, Bo – Boleszewo, OsK – Osieki Koszalińskie; soil species, org – organic soil, pgm – heavy loamy sand

12	13	14	15	16		
12	25	25	20	10		
25.05	19.06	19.06	09.06	29.06		
.	.	.	.	.		
2014	2014	2014	2012	2013	Mean	
Bo	Bo	Bo	OsK	OsK		
pgm	pgm	org	org	org		
2	2	2	5	5		
100	95	75	95	100		
.	5	.	.	5	20.06	
17	16	21	25	22	S	D
+.2	1.2	+.2	1.2	3.3	V	3248
·	.	.	·	+	III	144
·	1.2	+	.	.	II	106
5.5	3.3	3.3	4.4	2.2	V	4782
·	.	·	.	+	II	62
+	·	+	.	.	II	50
+	1.2	.	1.2	+	V	262
+	1.2	.	.	.	III	175
+.2	.	1.1	+	+	III	94
+	.	.	.	+	III	44
.	·	1.1	·	.	II	87
.	·	+	·	.	II	75
+	·	.	·	.	II	25
.	.	.	+	.	II	25
+	1.2	1.2	1.2	3.3	V	816
.	+	+	+	+	IV	150
+	.	.	1.1	.	III	250
1.1	.	1.2	.	1.1	III	108
+	.	1.1	.	+	II	56
.	·	·	·	+	II	31
.	+	+	.	.	II	25
+	2.2	2.2	1.2	+	V	400
·	1.1	·	+	+	IV	112
·	.	.	+	.	III	156
.	+.2	.	1.2	1.1	III	131
+	.	.	.	1.1	III	119
.	.	+	·	.	II	75
.	.	.	1.2	.	II	75
.	.	.	+	.	II	81
+	.	.	+	.	II	62
.	·	+	·	.	II	50
+..2	1.2	+.2	+.2	·	V	237
.	+.2	1.2	1.2	·	III	156
.	.	.	+	+.2	III	94
.	·	.	·	1.2	II	75
.	·	+	·	·	II	50
.	.	.	+	+.2	II	31
.	+	.	+	+	II	25
.	.	+	1.2	.	III	75
.	.	.	.	.	II	344
·	·	·	·	·	II	25

References

Balcerkiewicz S. 1978. Vegetation of Polana Chochołowska (Chochołowska Clearing) in the West Tatras. In: T. Wojterski (ed.). Guide to the Polish International Excursion 1-20 June 1978. Uniwersytet im. Adama Mickiewicza w Poznaniu. Ser. Biologia 11: 355-381.

Brzeg A. 1989. A systematic survey of 'saum'-communities found and possibly occurring in Poland. Fragm. Flor. Geobot. 34: 385-425

Bednarek R., Dziadowiec H., Pokojska U. & Prusinkiewicz Z. 2005. Badania ekologiczno-gleboznawcze. 344 pp. PWN, Warszawa.

Hadač E., Březina P., Ježek V., Kubička J., Hadačová V. &Vondráček M. 1969. Die Pflanzengesellschaften des Tales 'Dolina Siedmich Prameńov' in der Belaer Tatra. Vegetacia ČSSR B2, Vydavatelstvo Slovenskej Akademie Vied, Bratislava.

Hennekens S. M. & Schaminée J. H. J. 2001. TURBOVEG, a comprehensive database management system for vegetation data. J. Veg. Sci. 12: 1-589.

Kondracki J. 2004. Geografia regionalna Polski. 441 pp. Wyd. Nauk. PWN, Warszawa.

Matuszkiewicz J. M. 1993. Krajobrazy roślinne i regiony geobotaniczne Polski. IGiPZ PAN Prace Geograf. 158: 5-107.

Matuszkiewicz W. 2001. Przewodnik do oznaczania zbiorowisk roślinnych Polski. In: J. B. Faliński (ed.). Vademecum Geobotanicum, 3, 537 pp. Wyd. Nauk. PWN, Warszawa.

Mirek Z., Piękoś-Mirkowa H., Zając A. & Zając M. 2002. Flowering plants and pteridophytes of Poland. A checklist. In: Z. Mirek (ed.). Biodiversity of Poland, 1, 442 pp. W. Szafer Institute of Botany, Polish Academy of Sciences, Kraków.

Mucina L. 1993. *Galio-Urticetea*. In: L. Mucina, G. Grabherr & T. Ellmauer (eds), Die Pflanzengesellschaften Österreichs. Teil I. Anthropogene Vegetation, pp. 203-251. Gustav Fischer Verlag, Jena-Stuttgart-New York.

Nowosielski O. 1974. Metody oznaczania potrzeb nawożenia. 720 pp. PWRiL, Warszawa.

Ochyra R., Żarnowiec J. & Bednarek-Ochyra H. 2003. Census Catalogue of Polish Mosses. In: Z. Mirek (ed.). Biodiversity of Poland, 3, 372 pp. Polish Academy of Sciences, Institute of Botany, Kraków.

Pender K. & Rybałtowska Z. 1995. Vegetation of reservation 'Beech forest at Skarszyn'. Acta Univ. Wratislav., Prace Bot. 62: 79-99.

Pender K. & Macicka-Pawlik T. 1996. Deciduous forests of the Lower subalpine zone in the midst of rocky-gates in the Pośna Valley of Stołowe Mountains. Acta Univ. Wratislav., Prace Bot. 70: 21-46.

Podani J. 1993. Syn-Tax – pc. Computer Programs for Multivare Data Analysis in Ecology and Systematics. Version 5.0. User's Giude. Scientia Publishing, Budapest, pp. 351.

Ratyńska H., Wojterska M. & Brzeg A. 2010. Multimedialna encyklopedia zbiorowisk roślinnych Polski.

Narodowy Fundusz Ochrony Środowiska i Gospodarki Wodnej w Warszawie, CD 1-2.

Świerkosz K., Dajdok Z. & Szczęśniak E. 2002. The association *Geranio phaei-Urticetum dioicae* in southwest Poland. Polish Botanical Journal 47(1): 53-66.

Wojterska M. 1990. Mezofilne zbiorowiska zaroślowe Wielkopolski. PTPN, Prace Kom. Biol. 72: 3-125.

Zając A. 1978. Atlas of distribution of vascular plants in Poland (ATPOL). Taxon 27(5-6): 481-484.

Zając M. 1996. Mountain vascular plants in the Polish Lowlands. Polish Botanical Studies 11: 1-92.

Zając M. & Zając A. 2009. The geographical elements of native flora of Poland. 94 pp. Edited by Laboratory of Computer Chorology, Institute of Botany, Jagiellonian University, Kraków.