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VASCULAR PLANTS IN SELECTED SITES IN THE TOWN OF OSTRÓW WIELKOPOLSKI

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ABSTRACT. The study presents the results of floristic studies on parks, cemeteries and railway tracks in the town of Ostrów Wielkopolski. As a result of the investigations a total of 484 species were found. Among other things, the geographical and historical composition, the spectrum of life forms and socio-ecological groups, ecological indexes and the scale of hemeroby were analyzed. In the investigated area 15 protected species are found (10 covered by complete and five by partial protection). Moreover, five rare and endangered species were reported.

Key words: Ostrów Wielkopolski, Wielkopolska, vascular plants, flora

Introduction

Ostrów Wielkopolski with an area of 42 km² and approx. 75 thousand inhabitants is a town of the macroregion of the South Great Poland Lowlands and the mesoregion of the Calisia Plateau. The oldest data on the flora of Ostrów Wielkopolski date back to the first half of the 19th century (**Marten** 1873). The author in his guidebook “Flora Ostroviensis” listed 881 species of wild and cultivated plants. The herbarium prepared by Marten was donated to the collection of the Poznań Society of Friends of Sciences, which regrettably was lost during World War II (**Banach** 1996). Single pieces of floristic information from the area of this town are contained in scarce scientific publications (**Hantz** 1972, **Celka** and **Żywica** 2004). In this respect municipal parks are very well documented, but these are only dendrological studies (**Janowska et al.** 1992 a, b, c).

At the local level knowledge on the state of natural environment is of paramount importance. It is a necessary precondition of proper protection of natural values against an incursion or even destruction. This problem is especially significant in terms of town and country planning. Knowledge on the natural value and precise location of such sites by the local government unit responsible for environmental protection is a necessary condition for its protection (**Dolata** 2004).

It results from the above data that floristic studies conducted so far in Ostrów Wielkopolski are far from sufficient.

The main aim of the three-year studies was to determine the current state of all vascular plants in two parks: Municipal [Miejski] and Piaski Szczygliczka, in two cemeteries: municipal and evangelical, as well as at the railway tracks and the municipal landfill.

A historical overview of Ostrów Wielkopolski

The oldest mention of Ostrów Wielkopolski is the information given in a late 17th century document that already in 1404 Ostrów was a town. In the same period the first church was built (**Wędzki** 1990). The first owner of the town, mentioned in 1434, was the Calisia canon Jerzy z Ostrowa. Ostrów belonged also to the great Crown treasurer Rafał Leszczyński, the father of the later king Stanisław. In 1699 the whole Przygodzie estate together with Ostrów was purchased by the great Crown treasurer Jan Jerzy Przebendowski. During the Swedish invasion Ostrów suffered damage as a result of the march of numerous military units. In 1711 burgers of the town decided to renounce the town charter – Ostrów formally became a village. This date is a turning point in the history of Ostrów and its region. The first period of Ostrów's existence as a town was finished. However, in 1714 on the initiative of Jan Jerzy Przebendowski Ostrów was re-established as a town (**Boras** 1990). The next owner of Ostrów from 1729 was the great Crown marshal Franciszek Bieliński, who funded the Ostrów town hall in 1731 (**Olejniczak** 2004).

In the 18th century Ostrów in terms of building development was initially a small town, which started to expand since 1750's. The town centre was located around a cobbled market square, on which a town hall with a tower was built in 1731. Streets were paved with wooden planks and covered with sand. Market days organized in the market place were held initially once a week, and from 1889 twice a week (**Boras** 1990). Inhabitants of Ostrów in the first half of the 18th century were predominantly involved in agriculture. Ostrów developed exceptionally fast and prospered. The last owner of the town was Duke Antoni Henryk Radziwiłł, a talented composer and cello player, who wrote music e.g. to *Faust* by Goethe. At his expense a new brick town hall was erected in Ostrów in 1828. The highest success of the town was the opening in 1845 of a secondary school with a programme of Polish language teaching. It was the first secondary school in southern Wielkopolska, designated primarily for Polish pupils (**Nawrocki** 1990).

After Poland regaining independence after World War I the town continued to develop. Soon Ostrów had a gas plant, a water supply system, a sewerage system, a municipal market place, a town abattoir and a swimming pool.

By 1920 Ostrów developed a local industrial centre, connected with agriculture. Vast forests in the vicinity of the town constituted a raw material base for wood industry and resources of clay were used by seven brickyards. The year 1920 marked a breakthrough in the history of industry in Ostrów, as the construction of the "Wagon" factory was initiated. In the years after World War II Ostrów was transformed into an industrial centre. It was the result of both its advantageous location at the crossroads as well as its well-developed technological infrastructure and labour resources.

A short characteristic of selected sites

At present green areas in Ostrów Wielkopolski take up 538.4 ha, including parks and greens (30.3 ha), street green areas (33.8 ha), municipal forests (37.7 ha), privately owned forests (9 ha), state forests (312 ha) and allotments (115.6 ha); gardens of detached houses were not included. There are two real parks in Ostrów Wielkopolski: the Municipal Park [Park Miejski] and the 3rd May Park [Park 3 Maja]. Although the Mickiewicz, Kiliński or Marcinkowski Parks have always been considered parks by the inhabitants of the town, they may not be considered parks in the full meaning of this term (Olejniczak 2004). A total of 126 tree and shrub species were reported in Ostrów parks (Dolata 2003).

Within the city limits there are 11 specimens of seven tree species and 1 specimen of a climbing plant, which are covered by strict protection as nature monuments (Dolata 2004). These are common yew (*Taxus baccata*), four specimens of English oak (*Quercus robur*), wild pear (*Pyrus pyraster*), two specimens of silver maple (*Acer saccharinum*), American basswood var. Moltke (*Tilia americana* 'Moltkei'), silver lime var. Warszawska (*Tilia tomentosa* 'Varsaviensis'), European white elm (*Ulmus laevis*) and common ivy (*Hedera helix*), covering a European larch tree (*Larix decidua*) almost at its full height.

The Municipal Park [Park Miejski]

It is situated in the city centre, between streets, which are planted on both sides with trees: an avenue named aleja Powstańców Wielkopolskich – with common walnut planted in three rows, a street named ulica Piłsudskiego – with common hawthorn and box alder, a street named ulica ks. Kompały – with elm and a street named ulica kard. Ledóchowskiego – with small-leaved lime. The park was founded in the years 1942-1943, and female prisoners from a Nazi work camp were employed to establish it. Some trees were planted already as large specimens. The park was modernized in 1955 and in the 1970's (Olejniczak 2004). The park has the total area of 6 ha. The central part is taken up by a pond (with the area of 0.63 ha), with a small amphitheatre seating approx. 200 located nearby. A design component complementing the pond is a vast clearing, located in the north-eastern part of the park. There are 65 tree and shrub species in the park (including varieties), some of which are worth mentioning: honey locust, London plane, Turkish hazel, various varieties of ornamental apple trees and two nature monuments: silver maple and silver lime (Janowska et al. 1992).

Piaski-Szczygliczka

For the inhabitants of Ostrów this is a park called Park Kultury i Wypoczynku. It is located in the northern part of the town. This area is situated in the vicinity of forests and meadows. In the years 1974-1978 a retention and recreation reservoir with the area of 30.6 ha, depth of 2.1 m and capacity of 652 thousand m³ was built on the Ołobok River flowing through the northern part of the town. On the northern forested bank of the reservoir a beach was established with playgrounds, while on the north-western

bank there is a scout hostel. The reservoir together with an island and reeds constitute an important breeding and nesting ground for birds. The breeding species are the crested grebe, penduline tit, moorhen and mallard. In the vicinity of a former forester's lodge an apiculture open air museum [Skansen Pszczelarski im. Marty i Edwarda Pawlaków]. Another tourist attraction is a narrow-gauge railway, created in mid-1970's (Olejniczak 2004).

Municipal Cemetery [Cmentarz Komunalny] located at the Wroclawska street

It is frequently called "the old cemetery", since it was established before 1784. It is one of the oldest still maintained Roman Catholic cemeteries in Poland (Suszycki 2003). It was initially established outside the town, at present being within the city limits. It is an exceptional cemetery in terms of architecture of masonry tombs, a cemetery chapel, a wrought and cast iron fence and free standing crosses. These are undoubtedly relics of the magnificent craftsmanship of the 19th century, thanks to which the cemetery has a unique character (Grześkowiak 1996). In the old cemetery there are graves of numerous persons of merit distinguished for their services to Ostrów and the Wielkopolska region, including also those fighting for Poland's independence in successive uprisings.

The flora of the cemetery is specific and characteristic for memorials and places of worship. This uniqueness results from the method the site is used, e.g. tending the area around graves or bringing one's own plants are reflected in species diversity. At the analyzed cemetery special attention ought to be paid to avenues planted with hornbeam and lime trees.

Municipal cemetery at the Limanowskiego street

The necropolis was opened in 1905. The area was divided into eight parts with separate sections for children and military men; moreover, unconsecrated plots were also established where suicides and executed criminals were buried. The cemetery takes the area of approx. 3 ha and belongs to the concathedral parish. In various places of the cemetery graves of known and distinguished individuals may be found, e.g. the Reverend Walenty Śmigielski and Stefan Rowiński (Olejniczak 2004).

Evangelical cemetery at the Grabowska street

The first Evangelical cemetery existed in Ostrów as early as the 17th century, although its precise location is unknown. In the second half of the 18th century a cemetery was established around the church at the present-day street called ulica Królowej Jadwigi. Most probably in 1806 the plot for the new cemetery was marked out at the corner of the present-day streets ulica Raszowska and Wojska Polskiego. The cemetery is approx. 0.1 ha in area and is located at ulica Grabowska, i.e. in the eastern part of the town. It has the shape of an elongated rectangle with a semicircle cut at the axis of the shorter southern edge. Mass graves of German soldiers from 1945 and devastated monuments from 1928, commemorating 86 soldiers of the Ostrów garrison, killed in World War I are also found at the cemetery. Frequently there were times when the

cemetery was not treated with due respect as is reflected in numerous acts of vandalism. In 2003 approx. 100 trees were cut down, even a monumental specimen of common ivy was not spared. Among the specimens found in the cemetery there are e.g. a Norway maple 'Schwedlera', Canada hemlock and common larch with common ivy entwined around its stem (**Olejniczak** 2004).

Railway tracks

The tradition of Ostrów as a rail junction dates back to 1875, when the first line Poznań–Ostrów–Kluczbork was opened. It was a railway line facilitating transport from Poznań to Silesia (a Kluczbork–Katowice line had been opened before that). Next in 1888 the Ostrów–Leszno line was opened, followed in 1894 by the Ostrów–Skalmierzyce (Kalisz) line, and in 1909 by the Ostrów–Odolanów line (**Suszycki** 2003). Soon Ostrów became one of the biggest passenger railway station in the Wielkopolska region. It was an important freight station as most trains from Silesia were sent through the Kluczbork–Poznań line. When in 1920 a railway carriage factory "Wagon" was opened, Ostrów became the town of railway men. In the 1970's the electrification of the Ostrów junction was initiated. The last train with a steam engine left Ostrów on 16 May 1992 (**Olejniczak** 2004). At present within the area of railway tracks a wide variety of plant species may be found and transport has a considerable effect here.

Municipal Landfill Site

In 1986 the landfill site located at ulica Staroprzygodzka 121 was opened. It is situated at the old gravel pit approx. 3.5 km south of the town centre. The landfill has an area of 4.48 ha and it may store 450 thousand cubic metres of waste. At present it takes annually approx. 34 thousand tons of various waste (<http://www.mzo.ostrow-wielkopolski.pl>).

Material and methods

Floristic studies were conducted in the years 2003-2005, among other things in two parks, three cemeteries, at railway tracks and on the landfill site. The nomenclature was adopted according to **Mirek et al.** (2002).

A list of species was used for the purpose of statistical analysis and an analysis of flora in the investigated objects, including e.g. their affiliation to life forms according to Raunkiaer (**Zarzycki et al.** 2002) and geohistorical groups (**Zajac** 1979, **Chmiel** 1993 a, b, **Jackowiak** 1993). Socio-ecological groups are presented according to **Jackowiak** (1990). Moreover, ecological indicator values (**Zarzycki et al.** 2002) and the scale of hemeroby (**Sukopp** 1972, **Celka** 1999) were also determined. Herbarium materials were collected in a herbarium of the Department of Botany, Agricultural University of Poznań (POZB).

Results

In the investigated flora all the main systematic groups of vascular plants are represented: pteridophytes (*Pterophytina*, *Lycophytina*, *Sphenophytina*), gymnosperms (*Corniferophytina*) and angiosperms (*Magnoliophytina*), including dicotyledonous (Magnoliopsida) and monocotyledonous plants (Liliopsida).

A total of 484 species were reported in the objects (Table 1) from 282 genera and 82 families. Angiosperms were represented in biggest numbers. Families with the biggest numbers of species are Asteraceae with 67 species, Poaceae (49 species) and Brassicaceae (34). A total of 27 families have only one representative each. The biggest numbers of species were reported in genera *Veronica* (9) and *Rumex* (8). In genera *Salix*, *Trifolium* and *Poa* seven species were found in each. In Ostrów objects 15 protected species were found (the official gazette "Dziennik Ustaw" no. 168, item 1764), including ten covered by complete protection: *Angelica archangelica* (angelica), *Centaurium pulchellum* (branched centaury), *Galanthus nivalis* (common snowdrop), *Lathyrus latifolius* (everlasting pea), *Lilium martagon* (Turk's cap lily), *Lycopodium clavatum* (running pine), *Matteucia struthiopteris* (ostrich fern), *Ornithogalum nutans* (drooping star-of-Bethlehem), *Ornithogalum umbellatum* (star of Bethlehem), *Sorbus intermedia* (Swedish mountain ash) and five species covered by partial protection: *Convallaria majalis* (lily of the valley), *Frangula alnus* (alder buckhorn), *Hedera helix* (common ivy), *Helichrysum arenarium* (sand cudweed) and *Ononis arvensis* (field restharrow). Three liana species were reported: *Calystegia sepium* (hedge false bindweed), *Convolvulus arvensis* (field bindweed), *Humulus lupulus* (hop) and four semiparasites: *Melampyrum pratense* (common cowwheat), *Odontites serotina* (red bartsia), *Viscum album* (mistletoe), *Viscum album* subsp. *austriacum* (Table 1).

Tabela 1

**Alphabetical list and ecological characteristic of the species from Ostrów Wlkp.
Alfabetyczny wykaz i charakterystyka ekologiczna gatunków Ostrowa Wlkp.**

No Lp.	Name of species Nazwa gatunku	FŻ	GGH	GEK	L	W	TR	HEM	Sites Stanowisko
1	2	3	4	5	6	7	8	9	10
1	<i>Acer campestre</i> L.	M	Ap	12	4	3	3-4	ome	PM,CE
2	<i>Acer negundo</i> L.	M	Kn	12	4	3-4	3-4	me	PM,TK
3	<i>Acer platanoides</i> L.	M	Ap	12	4	3	3-4	omep	PM,TK
4	<i>Acer pseudoplatanus</i> L.	M	Ap	12	3	3/4	4	omep	PM
5	<i>Acer saccharinum</i> L.	M	Ef	12	-	-	-	e	PM
6	<i>Acer tataricum</i> L.	M	Ef	12	-	-	-	-	PM
7	<i>Achillea millefolium</i> L. s.s.	H	Ap	5	4	2-3	3-4	mep	TK
8	<i>Acinos arvensis</i> (Lam.) Dandy	T,H	Ap	6	5	1-2	3	mep	TK
9	<i>Adoxa moschatellina</i> L.	G	Sn	12	2	3-4	4	om	CE
10	<i>Aegopodium podagraria</i> L.	H	Ap	11	3-4	3/4	4	ome	CS,TK,PS
11	<i>Aesculus hippocastanum</i> L.	M	Kn	16	-	-	-	me	PM
12	<i>Agropyron repens</i> (L.) P.B.	G	Ap	14	4	3	3	me	CE
13	<i>Agrostis capillaris</i> L.	H	Ap	6	4	2-3	3-4	ome	TK,PS

Table 1 – cont.

1	2	3	4	5	6	7	8	9	10
14	<i>Agrostis gigantea</i> L.	H	Ap	5	4	4	3-4	me	CK
15	<i>Agrostis stolonifera</i> L.	H	Ap	5	4	4	3-4	me	PS
16	<i>Ajuga reptans</i> L.	H	Sn	12	3	3	3-4	om	CS
17	<i>Aliaria petiolata</i> (M. Bieb.) Cav. & Grande	H	Ap	12	3	3/4	5	ome	PM,CE,CS
18	<i>Alisma lanceolatum</i> With.	Hy	Sn	4	4	5-6	4	m	PS
19	<i>Allium vineale</i> L.	G	Ap	6	4	3	3	me	PM,CE
20	<i>Alnus glutinosa</i> (L.) Gaertn.	M	Ap	11	3	5	3-4	ome	PS
21	<i>Alopecurus aequalis</i> Sobol.	H	Sn	11	4	5	4	omep	PS
22	<i>Alopecurus geniculatus</i> L.	H	Ap	5	4	5	4	me	PS
23	<i>Alopecurus pratensis</i> L.	H	Ap	5	4	4	4	me	PM,CS
24	<i>Althaea officinalis</i> L.	H	Ap	16	5	3	3-4	-	CK
25	<i>Alyssum alyssoides</i> L.	T	Ap	6	5	2	2	me	PS
26	<i>Amaranthus caudatus</i> L.	T	Ef	16	-	-	-	ep	CK
27	<i>Amaranthus chlorostachys</i> Willd.	T	Kn	13	5	3	4	e	PS,MSO
28	<i>Amaranthus lividus</i> L.	T	Kn	14	5-4	3	5	ep	TK
29	<i>Amaranthus retroflexus</i> L.	T	Kn	13	5-4	3	5	me	TK
30	<i>Anagallis arvensis</i> L.	T	Ar	13	4	3	3-4	e	CE
31	<i>Anchusa arvensis</i> (L.) M. Bieb.	T	Ar	13	5-4	2-3	3	me	CE,PS
32	<i>Anchusa officinalis</i> L.	H	Ap	14	5-4	3	3-4	mep	TK
33	<i>Anemone nemorosa</i> L.	G	Sn	12	3	3	3-4	om	PM,PS
34	<i>Angelica archangelica</i> L.	H	Kn	16	4	4	4	m	TK,PS
35	<i>Angelica sylvestris</i> L.	H	Sn	12	4-3	4	4	m	PS
36	<i>Anthemis arvensis</i> L.	T	Ar	13	4	3	2-3	me	CE
37	<i>Anthoxantum aristatum</i> Boiss.	T	Kn	13	4	2-3	2-3	e	CE,PS,MSO
38	<i>Anthriscus sylvestris</i> (L.) Hoffm.	H	Ap	12	4	3	4-5	ome	TK,PS
39	<i>Apera spica-venti</i> (L.) P. Beauv.	T	Ar	13	4	3	3	me	CE,TK
40	<i>Arabidopsis thaliana</i> (L.) Heynh.	H,T	Ap	13	4	2-3	2-3	me	CS,CE,CK
41	<i>Arabis alpina</i> L.	C	-	16	4	4	3	-	CK
42	<i>Arabis caucasica</i> Schlttd.	C	Ef	16	-	-	-	-	CS
43	<i>Arctium minus</i> (Hill.) Bernh.	H	Ap	14	4	3	4-5	me	PS,MSO
44	<i>Arctium tomentosum</i> Mill.	H	Ap	14	4	3	5	me	CE,TK
45	<i>Arenaria serpyllifolia</i> L.	T	Ap	6	4-5	2	2	mep	TK
46	<i>Armoracia rusticana</i> P. Gaertn., B. Mey & Scherb.	G	Ar	14	4	3	4	me	PS,MSO
47	<i>Artemisia absinthium</i> L.	Ch	Ar	14	5	2-3	3	me	TK,PS
48	<i>Artemisia campestris</i> L.	Ch	Ap	6	5	2	2	me	TK,PS,MSO
49	<i>Artemisia vulgaris</i> L.	Ch	Ap	14	5	3	4	me	CS,CE,TK
50	<i>Asparagus officinalis</i> L.	G	Ap	6	5	2	3	me	TK
51	<i>Astragalus glycyphyllos</i> L.	H	Ap	7	4	3	3	ome	TK,MSO
52	<i>Athyrium filix-femina</i> (L.) Roth.	H	Sn	16	2	3-4	3	m	PS

Table 1 – cont.

1	2	3	4	5	6	7	8	9	10
53	<i>Atriplex patula</i> L.	T	Ap	14	5	3	3-5	me	PS
54	<i>Avena fatua</i> L.	T	Ar	13	5	2-3	3	me	CE
55	<i>Avena sativa</i> L.	T	Ef	14	-	-	-	me	PS
56	<i>Ballota nigra</i> L.	Ch	Ar	14	4	3	4-5	me	TK
57	<i>Bellis perennis</i> L.	H	Ap	5	4	3-4	4	me	PM
58	<i>Berberis vulgaris</i> L.	N	Sn	7	5	2-3	3	m	PS
59	<i>Berteroa incana</i> (L.) DC.	H,T	Ap	14	5	2	3	mep	TK
60	<i>Betula pendula</i> Roth.	M	Ap	9	4	3	2-3	omep	PM,CS,TK
61	<i>Betula pubescens</i> Ehrh.	M	Sn	3	4	4-5	2-3	m	TK,PS
62	<i>Bidens frondosa</i> L.	T	Kn	3	5	3	4	me	PS
63	<i>Bidens tripartita</i> L.	T	Ap	3	5	4-5	4	me	PS
64	<i>Brassica napus</i> L.	T	Ef	16	2	4	4	me	TK
65	<i>Bromus carinatus</i> Hook. & Arn.	H	Kn	16	5	3	4	e	TK
66	<i>Bromus hordeaceus</i> L.	T	Ap	14	4	3	4	me	CS,PS
67	<i>Bromus inermis</i> Leys.	H	Ap	6	5	2-3	3	me	TK
68	<i>Bromus sterilis</i> L.	T	Ar	14	5	2	3	me	TK
69	<i>Bromus tectorum</i> L.	T	Ar	14	5	2	2	me	TK,PS
70	<i>Bryonia alba</i> L.	H	Kn	14	5	3	4-5	me	CS,TK
71	<i>Bunias orientalis</i> L.	H	Kn	14	5-4	2-3	3-4	ep	TK
72	<i>Calamagrostis epigejos</i> (L.) Roth	G	Ap	8	4	3	3	me	TK,PS
73	<i>Calendula officinalis</i> L.	T	Ef	16	-	-	-	ome	PS
74	<i>Callitriche</i> sp.	Hy	Ap	4	2	6	3	e	PS
75	<i>Caltha palustris</i> L.	H	Sn	5	4	5	4	om	PS
76	<i>Calystegia sepium</i> (L.) R. Br.	G,H,Li	Ap	10	3	4	4	me	PS
77	<i>Campanula rapunculoides</i> L.	H	Ap	7	4	3	3	ome	CS,CK,TK
78	<i>Capsella bursa-pastoris</i> (L.) Medik.	T	Ar	14	5	3	4	me	PM,CS,CE, CK,TK
79	<i>Cardamine hirsuta</i> L.	H,T	Sn	14	4	4	4	-	PS
80	<i>Cardamine pratensis</i> L. s.s.	H	Sn	5	4	4	4	me	PS
81	<i>Cardaminopsis arenosa</i> (L.) Hayek	H	Ap	5	4	2	3	mep	TK
82	<i>Carduus acanthoides</i> L.	H	Ar	14	5	2-3	3-4	me	TK
83	<i>Carduus crispus</i> L.	H	Ap	12	4	4	4	me	PS
84	<i>Carex acutiformis</i> Ehrh.	G,Hy	Sn	4	4-3	5	4	ome	PM,PS
85	<i>Carex gracilis</i> Curt.	G,Hy	Sn	4	4	5	4	m	PS
86	<i>Carex hirta</i> L.	G	Ap	14	4	2-4	2-4	ome	CS,TK
87	<i>Carex spicata</i> Huds.	H	Ap	12	4	3-2	3	omep	TK
88	<i>Carex vesicaria</i> L.	H,Hy	Sn	4	4	5	3-4	m	PS
89	<i>Carex vulpina</i> L.	H,G	Ap	6	4	5	4	me	TK,PS
90	<i>Carpinus betulus</i> L.	M	Sn	12	2/3	3	3/4	om	PM
91	<i>Centaurea cyanus</i> L.	T	Ar	13	5-4	3	3	me	CE,TK
92	<i>Centaurea jacea</i> L.	H	Ap	5	4	3	4	me	TK
93	<i>Centaurea stoebe</i> L.	H	Ap	6	5	3	2	mep	TK,MSO

Table 1 – cont.

1	2	3	4	5	6	7	8	9	10
94	<i>Centaurium pulchellum</i> (Sw.) Druce	T	Ap	3	5	4	4	e	PS
95	<i>Cerastium arvense</i> L. s.s.	C	Ap	6	5	2	2	me	PS
96	<i>Cerastium glomeratum</i> Thuill.	H	Sn	16	4	4	4	m	PS
97	<i>Cerastium holosteoides</i> Fr. em. Hyl.	C	Ap	5	4	3-4	3-4	me	CE,PS
98	<i>Cerastium semidecandrum</i> L.	T,H	Ap	5	5	2	2	me	CS,CE,TK,PS,MSO
99	<i>Cerastium tomentosum</i> L.	C	Ef	16	-	-	-	p	CE
100	<i>Cerasus avium</i> (L.) Moench	M	Ap	12	4	3	3/4	me	PM,CS,PS
101	<i>Chaerophyllum temulum</i> L.	H,T	Ap	12	3	4	4-5	ome	CE,TK,PS
102	<i>Chamaenerion angustifolium</i> (L.) Scop.	H	Ap	8	5-4	3	3-5	me	TK
103	<i>Chamomilla recutita</i> (L.) Rausch.	T	Ar	13	-	-	-	e	PS
104	<i>Chamomilla suaveolens</i> (Pursh) Rydb.	T	Kn	14	-	-	-	e	PS
105	<i>Chelidonium majus</i> L.	H	Ap	12	3-4	3	4-5	ome	CS,TK
106	<i>Chenopodium album</i> L.	T	Ap	14	5	3	4-5	mep	TK,PS,MSO
107	<i>Chenopodium glaucum</i> L.	T	Ap	3	5	4	4	e	PS
108	<i>Chenopodium hybridum</i> L.	T	Ar	14	5	3	4	me	PS
109	<i>Chenopodium polyspermum</i> L.	T	Ap	3	5-4	3	3-5	me	PS
110	<i>Chenopodium strictum</i> Roth	T	Kn	14	-	-	-	ep	TK
111	<i>Cichorium intybus</i> L.	H	Ar	14	5-4	3	3	me	TK
112	<i>Circaea lutetiana</i> L.	G	Sn	12	2	4	4	om	PS
113	<i>Cirsium arvense</i> (L.) Scop.	G	Ap	14	5	2-3	3-4	me	TK,PS
114	<i>Cirsium oleraceum</i> (L.) Scop.	H	Sn	5	4-3	4-5	4	me	PS
115	<i>Cirsium vulgare</i> (Savi) Ten.	H	Ap	14	5	3	3	me	TK,PS,MSO
116	<i>Convallaria majalis</i> L.	G	Sn	9	3	2-3	3	om	CS
117	<i>Convolvulus arvensis</i> L.	G,H,Li	Ap	14	5	2-3	3	me	TK
118	<i>Conyza canadensis</i> (L.) Cronq.	T,H	Kn	14	5	2-3	3	me	TK
119	<i>Corispermum leptopterum</i> (Ascherson) Iljin	T	Kn	14	5	2	2	mep	MSO
120	<i>Cornus alba</i> L.	N	Sn	12	3-4	2-4	4	ome	PM,PS
121	<i>Coronilla varia</i> L.	H	Ap	6	5	2	3	me	PS
122	<i>Corydalis intermedia</i> (L.) Merat	G	Sn	12	2	4	4	ome	PM
123	<i>Corylus avellana</i> L.	N	Sn	12	4	2-3	4-3	om	PM
124	<i>Corylus colurna</i> L.	N	Sn	12	-	-	-	-	PM
125	<i>Corynephorus canescens</i> (L.) P.B.	H	Ap	5	4	2	2	me	PS,MSO
126	<i>Cosmos binnatus</i> Cav.	T,H	Ef	16	-	-	-	ep	CK
127	<i>Cotoneaster</i> sp. Med.	N	Ef	16	2-5	2	2	-	PM
128	<i>Crataegus monogyna</i> Jacq.	N,M	Ap	7	3-5	3-4	3-5	ome	PM,TK
129	<i>Crepis biennis</i> L.	H	Ap	5	4	3	4	me	PS
130	<i>Crepis tectorum</i> L.	H	Ap	14	5	2-3	3	e	TK,PS

Table 1 – cont.

1	2	3	4	5	6	7	8	9	10
131	<i>Cruciata glabra</i> (L.) Ehrh.	H	Sn	12	4-3	3-4	4-3	m	TK
132	<i>Dactylis glomerata</i> L.	H	Ap	5	4	3	4-5	ome	CS,TK
133	<i>Dathonia decumbens</i> DC.	H	Sn	8	4-3	3-4	2	m	PS
134	<i>Daucus carota</i> L.	H	Ap	5	5	3	4	me	TK,PS
135	<i>Deschampsia caespitosa</i> (L.) P. Beauv	H	Ap	5	3-5	4	3-4	me	PS
136	<i>Descurainia sophia</i> (L.) Webb ex Prantl	T	Ar	14	4	3	4	me	CK,TK,PS
137	<i>Dianthus deltooides</i> L.	C,H	Ap	5	4/3	2	2	me	PS
138	<i>Digitaria ischaemum</i> (Schreb.) H.L. Mühl.	T	Ar	13	5	2	1-2	e	CK,MISO
139	<i>Digitaria sanguinalis</i> (L.) Scop.	T	Ar	14	4	3	2	ep	CK
140	<i>Diplotaxis muralis</i> (L.) DC.	T,H	Kn	14	5	2	3	e	PS
141	<i>Dipsacus silvestris</i> Huds.	H	Ef	16	5	3	3	e	PS
142	<i>Dryopteris cartusiana</i> (Vill.) H.P. Fuchs	H	Sn	12	2	3-4	3-4	ome	PS
143	<i>Dryopteris filix-mas</i> (L.) Schott	H	Ap	12	2	3-4	4	ome	CS
144	<i>Echinochloa crus-galli</i> (L.) P. Beauv.	T	Ar	13	5	3-4	4-5	me	CK,MISO
145	<i>Echinocystis lobata</i> (Mich.) Torr et A. Gray	T	Ef	16	5-4	3-4	4-5	e	TK,PS
146	<i>Echinops sphaerocephalus</i> L.	H	Kn	16	5	2-3	3	me	TK
147	<i>Echium vulgare</i> L.	H	Ap	14	5	2	3	me	TK,NSO
148	<i>Eleocharis palustris</i> (L.) R. et Sch.	Hy, G	Sn	4	4	5	4-3	m	PM,PS
149	<i>Epilobium adenocaulon</i> Hausskn.	H	Kn	4	5-4	3-4	4	mp	TK,PS
150	<i>Epilobium adnatum</i> Griseb.	H	Ap	4	3	4-5	-	e	PS
151	<i>Epilobium hirsutum</i> L.	H	Ap	5	4	5	4	me	PS
152	<i>Equisetum arvense</i> L.	G	Ap	13	4-5	3-4	3-4	me	TK,MISO
153	<i>Equisetum sylvaticum</i> L.	G	Sn	12	3	4	4-3	m	PS
154	<i>Eragrostis minor</i> Host	T	Kn	14	5	2	2-3	e	PS
155	<i>Erigeron annuus</i> (L.) Pers.	H	Kn	14	5-4	3	3	me	CS,TK,PS
156	<i>Erodium cicutarium</i> (L.) L'Hér.	H,T	Ap	6	5	2-3	3	me	CE,TK,PS
157	<i>Erophila verna</i> (L.) Chevall.	T	Ap	6	5	2-3	2	me	TK,PS
158	<i>Erysimum cheiranthoides</i> L.	T	Ap	14	5	3	2-3	me	PM,CS
159	<i>Erysimum marschallianum</i> Andr. ex M. Bieb.	H	Ef	14	-	-	-	-	TK
160	<i>Euonymus europaea</i> L.	N	Ap	12	3	3-4	4	ome	CE
161	<i>Euphorbia cyparissias</i> L.	G,H	Ap	6	5	2	3	ome	TK
162	<i>Euphorbia esula</i> L.	H	Ap	14	5	3	4	me	TK
163	<i>Euphorbia helioscopia</i> L.	T	Ar	13	5	3	4	me	TK
164	<i>Euphorbia marginata</i> Pursh	T	Ef	15	-	-	-	ep	PS
165	<i>Euphorbia peplus</i> L.	T	Ar	13	5-4	3-4	4-5	e	CS,TK
166	<i>Fagus sylvatica</i> L.	M	Kn	12	3	3	4-3	om	PM
167	<i>Fallopia convolvulus</i> (L.) A. Löve	T,H	Ar	13	5-4	3	3-4	me	CE,TK,MSO

Table 1 – cont.

1	2	3	4	5	6	7	8	9	10
168	<i>Festuca arundinacea</i> Schreb.	H	Ap	5	4	3-4	4	me	PS
169	<i>Festuca heterophylla</i> Lam.	H	Sn	9	3	2-3	3	ome	PS
170	<i>Festuca ovina</i> L. s.s.	H	Sn	9	4	2	2	om	PS
171	<i>Festuca pratensis</i> Huds.	H	Ap	5	4	3	4	me	PM
172	<i>Festuca rubra</i> L. s.s.	H	Ap	5	4	2-4	3	me	TK,PS
173	<i>Festuca trachyphylla</i> (Hack.) Krajina	H	Ap	9	5	1-2	3	mep	TK,MSO
174	<i>Ficaria verna</i> Huds.	G	Ap	11	3-4	4	4-5	ome	CS,CE
175	<i>Filago arvensis</i> L.	T	Ap	6	5	2	2	-	MSO
176	<i>Fragaria vesca</i> L.	H	Ap	8	3-4	3	3	me	PS
177	<i>Frangula alnus</i> Mill.	N	Sn	11	3-5	5-3	3	om	PS
178	<i>Fraxinus excelsior</i> L.	M	Ap	11	3	4-5	4	ome	PM,TK
179	<i>Fraxinus pennsylvanica</i> Marshall	M	Ef	16	-	-	-	m	PM,TK
180	<i>Fumaria officinalis</i> L.	T	Ar	13	5-4	3	4	me	CE
181	<i>Gagea pratensis</i> (Pers.) Dumort.	G	Ap	13	4	3	3	me	CK,CS
182	<i>Galanthus nivalis</i> L.	G	Ef	16	3	4	4	e	CE,CK
183	<i>Galeopsis angustifolia</i> (Ehrh.) Hoffm	T	Kn	14	5	2	2	e	TK
184	<i>Galeopsis bifida</i> Boenn.	T	Sn	8	5	3	3-4	ome	TK
185	<i>Galeopsis pubescens</i> Besser	T	Ap	12	4	3-4	4-5	om	CE,PS
186	<i>Galeopsis tetrahit</i> L.	T	Ap	8	4	3-4	3-4	me	CE,CK
187	<i>Galinsoga ciliata</i> (Raf.) S.F. Blade	T	Kn	13	5-4	3-4	4-5	me	TK
188	<i>Galinsoga parviflora</i> Cav.	T	Kn	13	5-4	3	4-3	me	CK,TK
189	<i>Galium aparine</i> L.	T	Ap	12	5-4	4-3	4-5	ome	CS,TK,PS
190	<i>Galium mollugo</i> L. s.s.	H	Ap	5	4	3	4	me	TK
191	<i>Galium palustre</i> L.	H	Sn	4	4	4-5	3	m	PM
192	<i>Geranium molle</i> L.	T	Ap	14	5	5	3-4	me	PS
193	<i>Geranium pusillum</i> Burm. F. ex L.	T	Ar	13	5	3	4	me	TK
194	<i>Geranium robertianum</i> L.	H,T	Ap	12	2-3	3	3-4	ome	TK,PS
195	<i>Geum urbanum</i> L.	H	Ap	12	2-3	3-4	3-4	ome	TK,PS
196	<i>Glechoma hederacea</i> L.	G,H	Ap	12	4-2	3-4	4	ome	PM,TK
197	<i>Gleditsia triacanthos</i> L.	M	Ef	12	-	-	-	-	PM
198	<i>Glyceria fluitans</i> (L.) R. Br.	Hy	Sn	4	4	6-5	4	m	PM,PS
199	<i>Gnaphalium sylvaticum</i> L.	H	Sn	12	4	3	3	m	PM,MSO
200	<i>Gnaphalium uliginosum</i> L.	T	Ap	3	5-4	4	3-4	e	PS,MSO
201	<i>Gypsophila repens</i> L.	C	Ef	16	5	3	3	-	CS
202	<i>Hedera helix</i> L.	Ch, N	Ap	12	3-5	3	4	me	CS,CK
203	<i>Helianthus tuberosus</i> L.	G	Kn	14	5-4	3-4	4	me	CK,TK
204	<i>Helichrysum arenarium</i> (L.) Moench	H	Ap	6	5	2	2	me	PS
205	<i>Heracleum sibiricum</i> L.	H	Ap	5	4	5	5	me	TK
206	<i>Heracleum sphondylium</i> L. s.s.	H	Ap	5	4	4	4	me	PS
207	<i>Herniaria glabra</i> L.	H	Ap	6	4	2	2	e	PS
208	<i>Hieracium murorum</i> L.	H	Sn	9	2-4	3-2	3	om	PS
209	<i>Hieracium pilosella</i> L.	H	Ap	6	5	2	2	me	TK,PS, MSO

Table 1 – cont.

1	2	3	4	5	6	7	8	9	10
210	<i>Hieracium sabaudum</i> L.	H	Ap	9	3-4	3	3	ome	MSO
211	<i>Holcus lanatus</i> L.	H	Ap	5	4	4	3-4	me	PS
212	<i>Holosteum umbellatum</i> L.	T	Ap	6	5	2-3	2	me	TK,PS
213	<i>Hordeum murinum</i> L.	T	Ar	14	5	2-3	3	mep	TK,PS
214	<i>Humulus lupulus</i> L.	H,Li	Ap	10	3	4-5	4-5	ome	CE,TK
215	<i>Hypericum perforatum</i> L.	H	Ap	6	4	2-3	3-4	mep	TK,MSO
216	<i>Hypochoeris glabra</i> L.	T	Ap	6	5	3	2	e	CS,TK,PS
217	<i>Hypochoeris radicata</i> L.	H	Ap	5	4	3	4-3	me	MSO
218	<i>Impatiens parviflora</i> DC.	T	Kn	12	4-2	3	4	ome	TK,PS
219	<i>Inula britannica</i> L.	H	Ap	5	4	4	4	me	PS
220	<i>Isatis tinctoria</i> L.	H	Ef	16	-	-	-	e	TK
221	<i>Jasione montana</i> L.	H	Ap	5	4	2	2	me	MSO
222	<i>Juglans regia</i> L.	M	Ef	16	-	-	-	me	PM,TK
223	<i>Juncus articulatus</i> L. em. K. Richt.	H	Ap	5	5	4-5	3-4	me	PS
224	<i>Juncus bufonius</i> L.	T	Ap	3	5	4-5	3-4	me	PS,MSO
225	<i>Juncus compressus</i> Jacq.	G	Ap	5	4	4	4	me	PM
226	<i>Juncus conglomeratus</i> L. em. Leers	H	Ap	5	4	4-5	3	ome	PS
227	<i>Juncus effusus</i> L.	H	Ap	5	4	4-5	4-3	me	PS
228	<i>Juncus tenuis</i> Willd.	H	Kn	12	4	4	3-4	me	PS
229	<i>Knautia arvensis</i> (L.) J.M. Coult.	H	Sn	5	5	3	3-4	me	PS
230	<i>Kochia scoparia</i> (L.) Schrader	T	Ef	16	5	2-3	3-4	ep	MSO
231	<i>Lactuca serriola</i> L.	H	Ar	14	5	2-3	3	me	CE
232	<i>Lamium album</i> L.	H	Ar	13	5-4	3	4	me	TK
233	<i>Lamium amplexicaule</i> L.	T	Ar	13	5	2-3	3-4	me	TK
234	<i>Lamium maculatum</i> L.	H	Sn	12	5-3	4	4	om	CS
235	<i>Lamium purpureum</i> L.	H,T	Ar	14	5	3	4	ome	PM,TK
236	<i>Lapsana communis</i> L. s.s.	H,T	Ap	12	5-3	3	3-4	ome	TK,PS
237	<i>Larix decidua</i> Mill.	M	Ef	16	5	3	2	me	CE
238	<i>Lathyrus latifolius</i> L.	H	Kn	16	5	2	4	-	CE
239	<i>Lathyrus tuberosus</i> L.	G	Ar	13	5	2-3	3-4	e	TK
240	<i>Lemna minor</i> L.	Hy	-	1	4	6	4-3	-	PM
241	<i>Leontodon autumnalis</i> L.	H	Ap	5	4	3	4	me	PS
242	<i>Leontodon teraxacoides</i> (Vill.) Mer.	H	Ap	6	4	4	3	p	PS
243	<i>Leonurus cardiaca</i> L.	H	Ar	12	5	2-3	3-4	mep	TK,PS
244	<i>Lepidium campestre</i> (L.) R. Br.	T	Ar	14	5	2-3	3-4	p	TK
245	<i>Lepidium densiflorum</i> Schrad.	T	Kn	14	5	2-3	3	p	TK,MSO
246	<i>Lepidium ruderales</i> L.	H,T	Ar	14	5	2-3	4	me	TK,PS
247	<i>Lepidium virginicum</i> L.	T	Ef	14	5	2-3	3-4	p	PS
248	<i>Leucathemum vulgare</i> Lam. s.s.	H	Sn	14	4	3	4	m	CS,CE,TK
249	<i>Ligustrum vulgare</i> L.	N	Kn	16	4	2-4	3-4	me	CE,TK
250	<i>Lilium martagon</i> L.	G	Sn	12	3	3	4	ome	CS
251	<i>Linaria vulgaris</i> Mill.	G	Ap	9	5	2-3	3-4	mep	TK,PS

Table 1 – cont.

1	2	3	4	5	6	7	8	9	10
252	<i>Linum usitatissimum</i> L.	T	Ef	16	-	-	-	ep	CS,PS
253	<i>Lithospermum arvense</i> L.	T	Ar	13	5-4	3	3-4	me	PS
254	<i>Lolium perenne</i> L.	H	Ap	14	4	3	4	mep	TK
255	<i>Lotus corniculatus</i> L.	H	Ap	5	4	3-4	4-3	me	TK,MSO
256	<i>Lotus uliginosus</i> Schkuhr	H	Sn	5	4	4-5	4-3	m	PS
257	<i>Lunaria annua</i> L.	T, H	Ef	16	-	-	-	e	PS
258	<i>Lupinus luteus</i> L.	T	Ef	16	-	-	-	me	CE
259	<i>Luzula campestris</i> (L.) DC.	H	Sn	9	4	2-3	2-3	m	PS
260	<i>Lychnis flos-cuculi</i> L.	H	Sn	5	4	4	4	m	PS
261	<i>Lycopersicon esculentum</i> Mill.	T	Ef	16	-	-	-	me	MSO
262	<i>Lycopodium clavatum</i> L.	C	Sn	8	4	3	2-3	m	CS
263	<i>Lycopus europaeus</i> L.	H,Hy	Ap	11	3	5	4	me	PM,PS
264	<i>Lysimachia nummularia</i> L.	C	Sn	4	3	4	4	om	PM,PS
265	<i>Lysimachia vulgaris</i> L.	H	Sn	5	4	4-5	4-3	m	PS
266	<i>Lythrum salicaria</i> L.	H	Ap	5	4	4-5	4	me	PS
267	<i>Mahonia aquifolium</i> (Pursh.) Nutt.	N	Ef	16	-	-	-	m	CE
268	<i>Maianthemum bifolium</i> (L.) F.W. Schmidt	C	Sn	9	2	3	3	om	PS
269	<i>Malus domestica</i> Borkh.	M	Ap	16	4	3	4	-	PM,TK
270	<i>Malus ×purpurea</i> Rehder	M	Ef	16	4	4	4	-	PM
271	<i>Malva neglecta</i> Wallr.	H,T	Ar	14	5	3-2	4-5	me	TK,PS
272	<i>Malva sylvestris</i> L.	H	Ar	14	5	3	4	me	PS
273	<i>Matricaria maritima</i> L. ssp. <i>inodora</i> (L.) Dostál	H,T	Ar	13	5	3	4	me	TK,PS
274	<i>Matteucia struthiopteris</i> (L.) Tod.	H	Ef	16	3	4	4	e	CS,CE
275	<i>Medicago falcata</i> L.	H	Ap	6	5	2-3	3-4	me	TK
276	<i>Medicago lupulina</i> L.	H,T	Ap	14	5	2-3	3-4	me	TK
277	<i>Medicago sativa</i> L. s.s.	H	Kn	5	5	3	4	me	TK
278	<i>Medicago ×varia</i> Martyn	H	Kn	14	5	2-3	-	me	TK
279	<i>Melampyrum pratense</i> L.	T,pp	Sn	9	3-4	3	2	om	PS
280	<i>Melandrium album</i> (Mill.) Garcke	T	Ap	14	5	3	4	ome	CS,CE,TK
281	<i>Melilotus alba</i> Medik.	T	Ap	14	5	2-3	3	me	TK,MSO
282	<i>Melilotus officinalis</i> (L.) Pall.	T	Ap	14	5	2	3	me	TK
283	<i>Mentha arvensis</i> L.	G,Hy	Ap	3	5	3-4	3-4	me	PM,PS
284	<i>Moehringia trinervia</i> (L.) Clairv.	H,T	Sn	12	1-2	3	3-4	om	CE
285	<i>Muscari neglectum</i> Guss. ex Ten.	G	Ef	16	-	-	-	-	CS
286	<i>Mycelis muralis</i> (L.) Dumort.	H	Sn	9	2-4	3	4-3	om	PS
287	<i>Myosotis arvensis</i> (L.) Hill	H,T	Ar	13	5	3	3/4	me	CE,CK,PS
288	<i>Myosotis stricta</i> Link ex Roen & Schult.	T	Ap	6	5	2	2	me	CK,PS
289	<i>Myosotis sylvatica</i> Ehrh. ex Hoffm.	H	Ef	12	2	3-4	4	me	CS,CE
290	<i>Myosoton aquaticum</i> (L.) Moench	G, H	Ap	11	4-3	4-5	4	me	PS
291	<i>Nepeta cataria</i> L.	C,H	Ar	14	5	2-3	3	e	TK

Table 1 – cont.

1	2	3	4	5	6	7	8	9	10
292	<i>Odontites serotina</i> (Lam.) Rchb. s.s.	T,pp	Sn	5	4	3-4	4	m	PS
293	<i>Oenanthe aquatica</i> (L.) Poiret	H,Hy	Ap	4	4	5-6	4	me	PS
294	<i>Oenothera biennis</i> L. s.s.	H	Ap	14	5	2-3	3-4	me	CS
295	<i>Oenothera rubricaulis</i> Kleb.	H	Ap	14	5	3	3-4	ep	TK
296	<i>Ononis arvensis</i> L.	H,N	Sn	6	5	3	3-4	m	MSO
297	<i>Onopordon acanthium</i> L.	H	Ar	14	5	2-3	3	me	PS
298	<i>Ornithogalum nutans</i> L.	G,C	Ef	16	-	-	-	me	CS
299	<i>Ornithogalum umbellatum</i> L.	G	Ef	16	5-4	3	3	e	CS,CK
300	<i>Oxalis corniculata</i> L.	T,H	Ef	16	5	2-3	4	e	CK
301	<i>Oxalis fontana</i> Bunge	G	Kn	13	5-4	3	3-4	me	CS,CK,TK
302	<i>Padus avium</i> Mill.	M	Sn	11	3	4	4	om	PM
303	<i>Padus serotina</i> (Ehrh.) Borkh.	M,N	Kn	9	3-4	3	3	me	TK,PS, MSO
304	<i>Panicum miliaceum</i> L.	T	Ef	16	-	-	-	e	CK,MSO
305	<i>Papaver argemone</i> L.	T	Ar	13	5	3	3	me	TK,PS
306	<i>Papaver dubium</i> L.	T	Ar	13	5	2-3	3	me	TK
307	<i>Papaver rhoeas</i> L.	T	Ar	13	5	3	4	me	CS,CE,TK, PS
308	<i>Papaver somniferum</i> L.	T	Ef	16	-	-	-	ep	PS
309	<i>Pastinaca sativa</i> L. s.s.	H	Ap	5	5	3	4	me	TK,PS
310	<i>Peucedanum oreoselinum</i> (L.) Moench	H	Sn	7	4	2	2-3	om	MSO
311	<i>Phalaris arundinacea</i> L.	G,H	Ap	4	4	5	4	me	PS
312	<i>Philadelphus coronarius</i> L.	N	Ef	16	-	-	-	me	PM,CK
313	<i>Phleum pratense</i> L.	H	Ap	5	4	2-3	3-4	me	PS
314	<i>Phragmites australis</i> (Cav.) Trin. ex Steud.	G,H	Ap	4	4-5	5-6	4-3	me	TK
315	<i>Picea abies</i> (L.) H. Karst.	M	Kn	9	3-4	3-4	2-3	m	PM
316	<i>Picris hieracioides</i> L.	H	Ap	13	4	2-3	3	me	TK
317	<i>Pinus nigra</i> J.F. Arnold	M	-	16	-	-	-	-	CE
318	<i>Pinus sylvestris</i> L.	M	Sn	9	4-5	2-4	1-3	ome	CE,TK
319	<i>Plantago intermedia</i> Gilib.	T,H	Ap	3	5	4	3-4	me	PM
320	<i>Plantago lanceolata</i> L.	H	Ap	5	4	2-4	3-4	me	TK
321	<i>Plantago major</i> L. s.s.	H	Ap	5	5	3-4	4-5	mep	CE,TK
322	<i>Plantago media</i> L.	H	Sn	5	4	2-3	4-3	me	PS
323	<i>Platanus ×hispanica</i> Mill. ex Münchh.	M	Ef	12	-	-	-	-	PM
324	<i>Poa angustifolia</i> L.	H	Sn	6	4	2-3	3	m	CS
325	<i>Poa annua</i> L.	H,T	Ap	5	5-3	3	4	me	CS,TK
326	<i>Poa compressa</i> L.	H	Ap	6	5	2	3	me	TK
327	<i>Poa nemoralis</i> L.	H	Ap	12	3	2-3	3	ome	PS
328	<i>Poa palustris</i> L.	H	Ap	12	4	4-5	4	m	PS
329	<i>Poa pratensis</i> L.	H	Ap	5	4	3	4	me	TK,PS
330	<i>Poa trivialis</i> L.	H	Ap	5	4	4	4	me	PM

Table 1 – cont.

1	2	3	4	5	6	7	8	9	10
331	<i>Polygonum amphibium</i> L.	G,Hy	Ap	5	4	6	4-3	me	PM
332	<i>Polygonum aviculare</i> L.	T	Ap	14	5	3	4-3	me	TK,MSO
333	<i>Polygonum lapathifolium</i> L. subsp. <i>pallidum</i> (With.) Fr.	T	Ap	14	5	3-4	4-5	mep	CE,CK
334	<i>Polygonum lapatifolium</i> L. subsp. <i>brittingeri</i> (Opiz) Rech. F.	T	Ap	3	5	3-4	4-5	e	PS
335	<i>Polygonum persicaria</i> L.	T	Ap	13	5	3	4-3	me	TK
336	<i>Populus alba</i> L.	M	Ap	1	4	3-4	4	me	TK
337	<i>Populus nigra</i> L.	M	Ap	10	4	3-4	4	me	PM
338	<i>Populus tremula</i> L.	M	Ap	9	3	3	3	ome	CS,TK,PS
339	<i>Potentilla anserina</i> L.	H	Ap	5	5	3-4	3-4	me	TK,PS
340	<i>Potentilla arenaria</i> Borkh.	H	Ap	5	5	1	2-3	me	PS
341	<i>Potentilla argentea</i> L. s.s.	H	Ap	6	5	2	3	me	TK,PS
342	<i>Potentilla collina</i> Wib. s.s.	H	Sn	6	5	2	2	me	TK
343	<i>Potentilla fruticosa</i> L.	N	Ef	16	-	-	-	-	CK
344	<i>Potentilla reptans</i> L.	H	Ap	14	5	3-4	3-4	me	CK,TK,MSO
345	<i>Prunella vulgaris</i> L.	H	Sn	5	4	3-4	4	me	PS
346	<i>Prunus domestica</i> L.	M,N	Kn	16	-	-	-	m	CE
347	<i>Prunus domestica</i> L. subsp. <i>insititia</i> (L.) Bonnier & Layens	M	Ef	16	-	-	-	me	TK
348	<i>Pyrus pyraeaster</i> (L.) Burgsd.	M	Ap	12	-	-	-	-	PM,TK
349	<i>Quercus robur</i> L.	M	Sn	12	4	3-4	3-4	om	CS,PS
350	<i>Quercus rubra</i> L.	M	Kn	9	4	3	2-3	m	PM
351	<i>Ranunculus acris</i> L. s.s.	H	Ap	5	4	3-4	4	me	CE,TK,PS
352	<i>Ranunculus auricomus</i> L. s.l.	H	Sn	12	4	4	4	m	PS
353	<i>Ranunculus repens</i> L.	H	Ap	5	4-5	4-3	4	me	PS
354	<i>Ranunculus sceleratus</i> L.	T	Ap	3	5	4-5	4	me	PS
355	<i>Raphanus raphanistrum</i> L.	T	Ar	13	5	3	3	e	TK,MSO
356	<i>Reseda lutea</i> L.	H	Ap	14	5	2-3	3-4	p	TK
357	<i>Reynoutria japonica</i> Houtt.	G	Kn	16	4-5	3-4	4	e	TK
358	<i>Rhamnus cathartica</i> L.	N	Sn	12	3-4	2-4	3	ome	PS
359	<i>Ribes alpinum</i> L.	N	Kn	16	3	3	3-4	m	CE,TK
360	<i>Ribes aureum</i> Pursh	N	Ef	16	-	-	-	e	PM
361	<i>Robinia pseudacacia</i> L.	M	Kn	14	4	2-3	3	mep	PM,TK,MSO
362	<i>Rorippa amphibia</i> (L.) Besser	H,Hy	Sn	4	4	5-6	4	omep	PS
363	<i>Rorippa sylvestris</i> (L.) Besser	G,H	Ap	14	5	3-4	3-4	e	PS
364	<i>Rorippa</i> × <i>armoracioides</i> (Tausch) Fuss	H	Ap	14	-	-	-	ep	PS
365	<i>Rosa canina</i> L.	N	Ap	7	4-5	3-4	3-5	me	PS
366	<i>Rosa rugosa</i> Thunb.	N	Kn	16	5	3	3	e	PS
367	<i>Rubus caesius</i> L.	Ch,N	Ap	12	4-5	2-4	3	ome	TK
368	<i>Rubus idaeus</i> L.	N	Ap	8	4-5	3-4	3-4	ome	PS

Table 1 – cont.

1	2	3	4	5	6	7	8	9	10
369	<i>Rubus plicatus</i> W. et N.	N	Sn	9	4-5	3-4	3	m	PS
370	<i>Rumex acetosella</i> L.	G,H	Ap	6	4-5	2	2	ome	CS,CE,PS, MSO
371	<i>Rumex confertus</i> Willd.	H	Kn	14	5	3-4	3-4	e	TK
372	<i>Rumex conglomeratus</i> Murr.	H	Ap	10	4-3	4-5	4	e	PS
373	<i>Rumex crispus</i> L.	H	Ap	14	5	3-4	4	me	PS
374	<i>Rumex hydrolapatum</i> Huds.	Hy,H	Sn	7	3-4	5-6	4-3	me	PS
375	<i>Rumex maritimus</i> L.	T	Ap	3	5	4	4	me	PS
376	<i>Rumex obtusifolius</i> L.	H	Ap	14	3-5	3-4	4-5	me	CE,PS
377	<i>Rumex thyrsiflorus</i> Fingerh.	H	Ap	14	5	2-3	3	mep	TK,MSO
378	<i>Sagina nodosa</i> (L.) Frenzl	H,C	Sn	11	4	4	3	om	PS
379	<i>Salix alba</i> L.	M	Ap	10	4	4	4	me	PS
380	<i>Salix caprea</i> L.	M,N	Ap	8	5-3	3-4	4-3	me	TK
381	<i>Salix fragilis</i> L.	M	Ap	10	4	4	4	me	PM
382	<i>Salix purpurea</i> L.	N	Ap	7	4	4	4	me	PS
383	<i>Salix triandra</i> L.	N	Sn	10	5	4	4	m	PS
384	<i>Salix viminalis</i> L.	N	Ap	7	5	4	4	m	PS
385	<i>Salix ×sepulcralis</i> Simk.	M	-	16	-	-	-	-	PM
386	<i>Sambucus nigra</i> L.	N	Ap	12	(5) 4-3	3-4	4-5	ome	PM,TK
387	<i>Sambucus racemosa</i> L.	N	Kn	8	3-4	3	4	m	PM
388	<i>Saponaria officinalis</i> L.	H	Ap	14	4	4	3-4	me	CS,CE,TK, MSO
389	<i>Sarothamnus scoparius</i> (L.) W.D.J. Koch	N	Sn	8	5	3	3	me	PS
390	<i>Saxifraga granulata</i> L.	H	Sn	6	5	2-3	3	m	PS
391	<i>Scirpus sylvaticus</i> L.	G	Sn	5	4	4-5	4	m	PS
392	<i>Scleranthus annuus</i> L.	T	Ar	13	5	2-3	2-3	e	CE,MSO
393	<i>Scorzonera humilis</i> L.	H	Sn	9	3	2-3	2-3	ome	PS
394	<i>Scutellaria galericulata</i> L.	H	Sn	4	4	4-6	4-3	m	PS
395	<i>Secale cereale</i> L.	T	Ef	13	-	-	-	me	TK
396	<i>Sedum acre</i> L.	C	Ap	6	5	1	1	me	TK,PS
397	<i>Senecio jacobaea</i> L.	H	Ap	6	4	2-3	3	me	CK
398	<i>Senecio vernalis</i> Waldst. & Kit.	T	Kn	14	5	2-3	2-3	me	CS,TK, MSO
399	<i>Senecio viscosus</i> L.	T	Ap	14	4	3	3	p	TK
400	<i>Senecio vulgaris</i> L.	H,T	Ar	13	5	3	3-4	mep	CE,TK, MSO
401	<i>Setaria pumila</i> (Poir.) Roem. & Schult.	T	Ar	13	5	2-3	3	e	CK
402	<i>Setaria viridis</i> (L.) P. Beauv.	T	Ar	13	5	3	3	me	TK,MSO
403	<i>Silene vulgaris</i> (Moench.) Garcke	C,H	Ap	14	4	3	3	me	TK
404	<i>Sinapis alba</i> L.	T	Ef	16	3	3	4	ep	PS
405	<i>Sinapis arvensis</i> L.	T	Ar	13	5	3	4	me	TK
406	<i>Sisymbrium altissimum</i> L.	T,H	Kn	14	5	2	3	me	TK,PS, MSO

Table 1 – cont.

1	2	3	4	5	6	7	8	9	10
407	<i>Sisymbrium loeselli</i> L.	T,H	Kn	14	5	2	3	me	TK
408	<i>Sisymbrium officinale</i> (L.) Scop.	T	Ar	14	5	3	4-5	me	TK
409	<i>Solanum dulcamara</i> L.	Ch,N	Ap	11	4	5-4	4-3	me	PS
410	<i>Solidago canadensis</i> L.	G,H	Kn	14	4-5	3-4	4	me	CE,CK,TK
411	<i>Sonchus arvensis</i> L.	G,H	Ap	14	5	3-4	3-4	me	PS
412	<i>Sonchus asper</i> (L.) Hill	T	Ar	13	5	3	4	me	CE
413	<i>Sonchus oleraceus</i> L.	H,T	Ar	13	5	3	4	me	CE,TK,PS
414	<i>Sorbus aucuparia</i> L. em. Hedl.	M,N	Ap	9	3	3-4	3	ome	PM
415	<i>Sorbus intermedia</i> (Ehrh.) Pers.	M,N	Ef	16	4	3	3	mp	PM,TK
416	<i>Sparganium erectum</i> L. em. Rchb. s.s.	Hy	Sn	4	4	6	4	m	PM
417	<i>Spergula arvensis</i> L.	T	Ar	13	5	3	2-3	me	CE,MSO
418	<i>Spergula morisonii</i> Bor.	T	Ap	6	5	2	2	me	PS
419	<i>Spergularia rubra</i> (L.) J. Presl & C. Presl	H,T	Ap	13	5	3-4	2-3	e	PS,MSO
420	<i>Spiraea salicifolia</i> L.	N	Ef	16	4-3	4	4	me	PM
421	<i>Spiraea ×vanhouttei</i> (Briot) Zabel	N	Ef	16	-	-	-	e	PM
422	<i>Spirodela polyrhiza</i> (L.) Schleiden	Hy	Sn	7	4	6	4-3	m	PM
423	<i>Stellaria graminea</i> L.	H	Ap	5	4	3	4	me	PS
424	<i>Stellaria media</i> (L.) Vill.	T	Ap	13	5	3-4	4-5	ome	PS
425	<i>Stellaria pallida</i> (Dumort.) Piré	T	Ap	13	4	2	3	ome	CS,CE,CK,TK
426	<i>Symphoricarpos albus</i> (L.) Blake	N	Kn	12	-	-	-	me	PM,TK
427	<i>Symphytum officinale</i> L.	G	Ap	9	4	4-5	4	me	PS
428	<i>Syringa vulgaris</i> L.	N	Kn	16	4	3	3	me	PM,CS,TK
429	<i>Tanacetum parthenium</i> (L.) Sch. Bip.	H	Kn	14	5	3	3-4	mep	CS
430	<i>Tanacetum vulgare</i> L.	H	Ap	14	5	3-4	4	ome	TK
431	<i>Taraxacum officinale</i> F.H. Wigg.	H	Ap	5	4	3	4	omep	PM,CS,CE,CK,TK,PS,MSO
432	<i>Thlaspi arvense</i> L.	T	Ar	13	5	3	4	me	TK,PS
433	<i>Thuja occidentalis</i> L.	M,N	Ef	16	-	-	-	e	PM,CK
434	<i>Tilia cordata</i> Mill.	M	Ap	12	3	3	4-3	ome	PM,CS,CE,CK
435	<i>Tilia platyphyllos</i> Scop.	M	Kn	12	3	3	4	me	PM
436	<i>Tilia tomentosa</i> Moench	M	Ef	12	-	-	-	-	PM
437	<i>Torilis japonica</i> (Houtt.) DC.	H,T	Ap	12	4	3	4	me	PS
438	<i>Tragopogon dubius</i> Scop.	H	Ap	14	5-4	2-3	3	me	CE,TK,PS
439	<i>Tragopogon orientalis</i> L.	H	Ap	6	4	3	3	me	TK
440	<i>Tragopogon pratensis</i> L. s.s.	H	Ap	5	4	3	4	me	TK
441	<i>Trifolium arvense</i> L.	T	Ap	6	5	2	1-2	me	PS,MSO
442	<i>Trifolium dubium</i> Sibth.	T	Ap	5	4	3	4	me	PS
443	<i>Trifolium fragiferum</i> L.	H	Ap	5	5	3-4	3-4	me	PS
444	<i>Trifolium hybridum</i> L.	H	Ap	5	4	4	4	me	PS

Table 1 – cont.

1	2	3	4	5	6	7	8	9	10
445	<i>Trifolium medium</i> L.	H	Ap	4	4	3-2	3	me	PS
446	<i>Trifolium pratense</i> L.	H	Ap	5	4	3	4	me	TK
447	<i>Trifolium repens</i> L.	H	Ap	14	4	3-4	4	me	TK
448	<i>Triticum aestivum</i> L.	T	Ef	16	-	-	-	me	CE
449	<i>Tsuga canadensis</i> (L.) Carriere	M	Ef	16	-	-	-	-	CE
450	<i>Tulipa kaufmanniana</i> Regel	G	Ef	16	-	-	-	me	CS
451	<i>Tussilago farfara</i> L.	G	Ap	14	5	3-4	3-4	me	CK,TK
452	<i>Typha latifolia</i> L.	H,Hy	Ap	4	4	6-5	4	me	PM,PS
453	<i>Ulmus glabra</i> Huds.	M	Ap	11	3	4-3	4	mep	CE,PS
454	<i>Ulmus laevis</i> Pall.	M	Ap	11	3	4	4	ome	PM,TK
455	<i>Urtica dioica</i> L.	H	Ap	12	2-5	3-4	4-5	ome	CE,TK
456	<i>Vaccinium myrtillus</i> L.	Ch	Sn	9	3-4	3-4	2-3	om	PS
457	<i>Verbascum densiflorum</i> Bertol.	H	Sn	6	5	2	4	me	CS,PS
458	<i>Verbascum lychnitis</i> L.	H	Ap	6	5	2-3	4	me	CS
459	<i>Verbascum phlomoides</i> L.	H	Sn	6	5	2-3	4	m	PS
460	<i>Verbascum thapsus</i> L.	H,T	Ap	6	5	3	3-4	mep	TK,PS
461	<i>Veronica anagallis-aquatica</i> L.	H	Ap	4	5-4	5-6	4	e	PS
462	<i>Veronica arvensis</i> L.	T	Ap	13	5-4	3	3-4	me	CS
463	<i>Veronica chamaedrys</i> L. s.s.	C	Ap	5	4	3	4	me	CE,PS
464	<i>Veronica dillenii</i> Crantz	T	Ap	6	4	2-3	2	e	CK
465	<i>Veronica hederifolia</i> L. s.s.	T	Ap	12	5	3	4	ome	CS,CE
466	<i>Veronica persica</i> Poir.	T	Kn	13	5	3	4-5	me	MSO
467	<i>Veronica sublobata</i> M.A. Fisch.	T	Ap	12	3-4	3-4	3-4	-	TK
468	<i>Veronica triphyllos</i> L.	T	Ar	13	5	3	3	me	CK
469	<i>Veronica verna</i> L.	T	Ap	6	5	2	2	me	PS
470	<i>Vicia angustifolia</i> L.	T	Ar	13	4	3-2	4-3	me	CE,PS, MSO
471	<i>Vicia cracca</i> L.	H	Ap	5	4	3	4	me	PS
472	<i>Vicia hirsuta</i> (L.) S.F. Gray	T	Ar	13	5-4	3	3-4	me	CE,TK
473	<i>Vicia tenuifolia</i> Roth.	G,H	Sn	6	4	2	4-3	m	TK
474	<i>Vicia tetrasperma</i> (L.) Schreb.	T	Ar	13	5	3	4-3	om	PS
475	<i>Vicia villosa</i> Roth	T	Ar	13	5	3	4-3	me	CE,TK
476	<i>Viola arvensis</i> Murray	T	Ar	13	5	3	3-4	me	CE,TK
477	<i>Viola odorata</i> L.	H	Ap	3	2-3	3-4	3-4	me	TK
478	<i>Viola reichenbachiana</i> Jord. ex Boreau	H	Sn	12	5	3	4-3	m	PS
479	<i>Viola riviniana</i> Rchb.	H	Sn	12	2-3	3	3	om	CK,PS
480	<i>Viola tricolor</i> L. s.s.	T	Ap	5	5	3	3-2	me	TK
481	<i>Viola wittrockiana</i> Hort.	H	Ef	16	-	-	-	-	CK
482	<i>Viscum album</i> L.	C,pp	Ap	12	4	-	-	me	PM,CS
483	<i>Viscum album</i> L. subsp. <i>austriacum</i> (Wiesb.) Vollm.	C,pp	Ap	12	4	-	-	me	PS
484	<i>Zea mays</i> L.	T	Ef	16	-	-	-	ep	CE

Symbols from:

FŻ – Raunkiaer's life forms groups: M – megaphanerophyte – tree, N – nanophanerophyte – strubs, Ch – lignified chamaephytes, C – herbaceous chamaephyte, H – hemicytrophite, G – geophyte, Hy – hydrophytes and helophytes, T – terophyte, Li – lianas, pp – green parasites.

GGH – geograph-historical groups: Sn – non-synanthropic spontaneophytes, Ap – synanthropic spontaneophytes, Ar – archeophytes, Kn – kenophytes, Ef – ergasiophytes.

GEK – socio-ecological groups: 1-15.

L – light indicator: 1-5 – values of the light indicator, **I** – plants without value of the light indicator.

W – moisture indicator: 1-5 – value of the indicator, **I** – plants without value of the moisture indicator.

Tr – nitrogen indicator: 1-5 – value of the indicator, **I** – plants without value of the nitrogen indicator.

HEM – degree of hemerobi: o – oligohemerobic, m – mezohemerobic, e – euhemerobic, p – polyhemerobic, **I** – plants without value of the hemerobi indicator.

Sites: PM – Cites Park, PS – Piaski-Szczygliczka, CS – cemetery municipal, Wrocławska Str. (“old”), CK – cemetery municipal, Limanowskiego Str., CE – cemetery evangelical, Grabowska Str., TK – railway tracks, MSO – Municipal Landfill Site.

Objaśnienia symboli:

FŻ – grupy form życiowych (Raunkiaera): M – megafaneroфіty, N – nanofaneroфіty, Ch – chamefity drewniałe, C – chamefity zielne, H – hemikryptoфіty, G – geofity, Hy – hydrofity i helofity, T – terofity, Li – liany, pp – półpaszożyty.

GGH – grupy geograficzno-historyczne: Sn – spontaneofity niesynantropijne, Ap – spontaneofity synantropijne, Ar – archeofity, Kn – kenofity, Ef – ergazjoфіty.

GEK – grupy socjologiczno-ekologiczne: 1-15.

L – wskaźnik świetlny: 1-5 – wartości wskaźnika świetlnego, **I** – brak określonej wartości wskaźnika.

W – wskaźnik wilgotności: 1-5 – wartości wskaźnika wilgotności, **I** – brak określonej wartości wskaźnika.

Tr – wskaźnik trofizmu: 1-5 – wartości wskaźnika trofizmu, **I** – brak określonej wartości wskaźnika.

HEM – stopnie hemerobii: o – oligohemerobny, m – mezohemerobny, e – euhemerobny, p – polyhemerobny, **I** – brak określonej wartości wskaźnika.

Stanowisko – PM – Park Miejski, PS – Piaski-Szczygliczka, CS – cmentarz komunalny przy ul. Wrocławskiej („stary”), CK – cmentarz komunalny przy ul. Limanowskiego, CE – cmentarz ewangelicki przy ul. Grabowskiej, TK – tory kolejowe, MSO – Miejskie Składowisko Odpadów.

Studies of vascular flora conducted in the seven selected objects in Ostrów Wielkopolski show that their species composition varies. It results e.g. from the functional character of individual objects, as well as their habitat conditions.

In the selected objects the following numbers of species were reported: The Municipal Park – 73 species, the municipal cemetery at the Wrocławska street – 59, the Evangelical cemetery at the Grabowska street – 72, the municipal cemetery at the Limanowskiego street – 38, railway tracks – 196, Piaski-Szczygliczka – 222, the Municipal Landfill Site – 54 species, respectively (Table 1). In terms of species diversity Piaski-Szczygliczka (the park) and railway tracks are exceptional.

It results from the analysis of the spectrum of life forms (FŻ – Table 1, Fig. 1) that among the eight basic groups hemicytrophites account for the highest percentage (40.57%) (Fig. 1). A considerable percentage was also found for therophytes, represented by 150 species, which amounts to over 27% (Fig. 1). Phanerophytes are represented by 88 species (15.86%). The pride of the Municipal Park is a megaphanerophyte honey locust (*Gleditsia triacanthos*). Geophytes, similarly to megaphanerophytes, are represented by 49 species (8.83%). Examples of rarely found geophytes include wood anemone (*Anemone nemorosa*). A slight percentage in the Ostrów objects was reported for herbaceous chamaephytes (18 species). Hydrophytes and helophytes (Fig. 1) jointly include 17 species (3.06%). In the Municipal Park e.g. manna grass (*Glyceria fluitans*) and common duckmeat (*Spirodela polyrhiza*) were reported. Species found at the reservoir in Piaski-Szczygliczka include e.g.: water knotgrass (*Polygonum amphibium*), water dropwort (*Oenanthe aquatica*), lanceleaf water plantain (*Alisma lanceolatum*) and

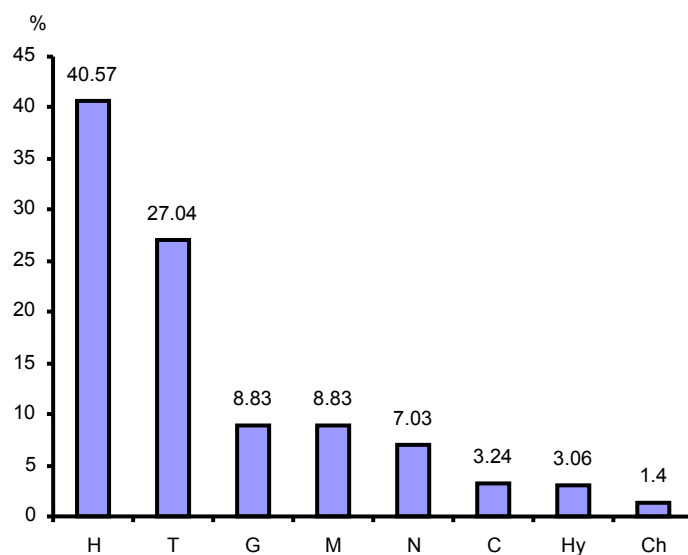


Fig. 1. Percentage of life form groups: M – megaphanerophyte, N – nanophanerophyte, C – herbaceous chamaephyte, G – geophyte, H – hemicryptophyte, Hel – helophyte, T – terophyte

Ryc. 1. Udział grup form życiowych we florze: M – megafanerofit, N – nanofanerofit, C – chamefit zielny, G – geofit, H – hemikryptofit, Hel – helofit, T – terofit

species from genus *Carex*. In both parks this group is represented by common spikerush (*Eleocharis palustris*), gypsywort (*Lycopus europaeus*) and reed mace (*Typha latifolia*). Woody chamaephytes constitute the least numerous group – eight species, amounting to only 1.4%. In the geo-historical spectrum indigenous species predominate, accounting for approx. 65% flora (GGH – Table 1, Fig. 2). Out of the spontaneophyte group 47.8% species permanently grow in considerably transformed habitats (apophytes). It is the most numerous group and its representatives are found in each analysed object. Anthropytes permanently established (archeophytes) include 61 species (12.62%) and in their number they slightly exceed ergasiophytes – 54 species (11.28%). Ergasiophytes as species going wild from crops were found in the vicinity of railway tracks, e.g. dyer's wool (*Isatis tinctoria*), and in cemeteries e.g. bread wheat (*Triticum aestivum*) or grape hyacinth (*Muscari neglectum*). Common millet (*Panicum miliaceum*) was reported both at the cemetery, in the area of railway tracks and in the landfill site. The analysis of habitat and phytocenotic range of the species constitutes the basis of socio-ecological classification (GEK). In the investigated area a total of 15 groups were distinguished: 1 – aquatic and spring vegetation, 2 – community of waterside therophytes, 3 – reed and sedge rushes, 4 – meadow vegetation, 5 – sand and xerothermic swards, 6 – thermophilous forest edge and thicket communities, 7 – acidophilous heaths and clearing communities, 8 – coniferous forests and acidophilous deciduous forests, 9 – marshy meadows and willow brushes, 10 – swampy and water-logged forests and alder carrs, 11 – thermophilous oak woods, mesophilous deciduous forests and nitrophilous thickets, 12 – segetal communities, 13 – ruderal communities, 14 – epilytic communities, 15 – species with undefined phytosociological classification.

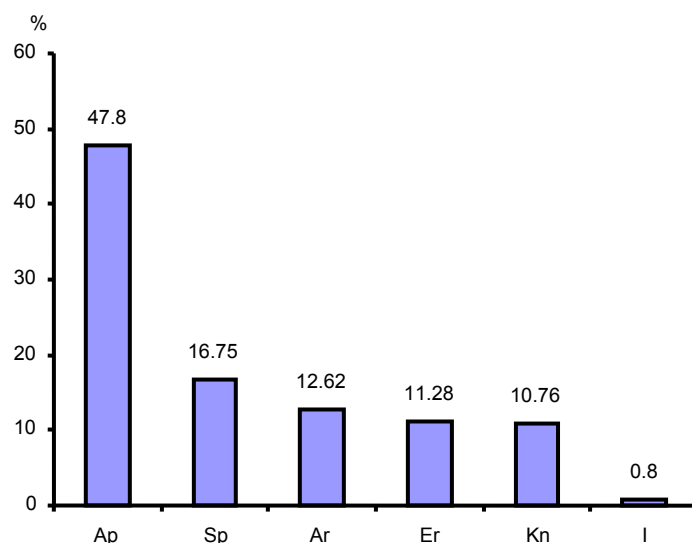


Fig. 2. Percentage of the geographical-historical groups: Ap – native plants, Ar – archeophytes, Kn – kenophytes, Sp – spontaneophytes, D – diaphytes

Ryc. 2. Procentowy udział grup geograficzno-historycznych: Ap – gatunki rodzime, Ar – archeofity, Kn – kenofity, Sp – spontaneofity, D – diafity

Variation in the number of species in socio-ecological groups ranges from one to 88 (over 18%). Species found as especially common include wormwood (*Artemisia absinthium*), purple deadnettle (*Lamium purpureum*), common mallow (*Malva neglecta*), white campion (*Melandrium album*), and creeping cinquefoil – *Potentilla reptans* (Fig. 3). A considerable participation of plants from group no. 13 (ruderal communities) may be connected with a high degree of transformation of habitats e.g. within railway tracks and roadsides.

A significant position in the flora of the Ostrów objects (14.05%) is occupied by meadow vegetation with 68 species. Among them common dandelion (*Taraxacum officinale*) and little mouse ear – *Cerastium semidecandrum* are frequently found (Fig. 3, Table 1).

Plants typical of coniferous forest account for a significant percentage of species in the socio-ecological classification of the town flora. A total of 66 species were included in this group, which amounts to 13.86%. They are represented by wood horsetail (*Equisetum sylvaticum*) and small-flowered balsam (*Impatiens parviflora*), which is found in exceptional abundance in the forest at the Piaski-Szczygliczka reservoir, and by common buckthorn (*Rhamnus cathartica*) (Fig. 3, Table 1).

A considerable percentage among the analysed species, i.e. approx. 12%, is accounted for by species of segetal communities, such as e.g. small bugloss (*Anchusa arvensis*) and 59 species representing group no. 15, e.g. California brome (*Bromus carinatus*), sticky chickweed (*Cerastium glomeratum*), star of Bethlehem (*Ornithogalum umbellatum*) (Fig. 3, Table 1). A rather significant percentage, i.e. 8.88% with 43 species is represented by a group of sandy and xerothermic swards. The specific character

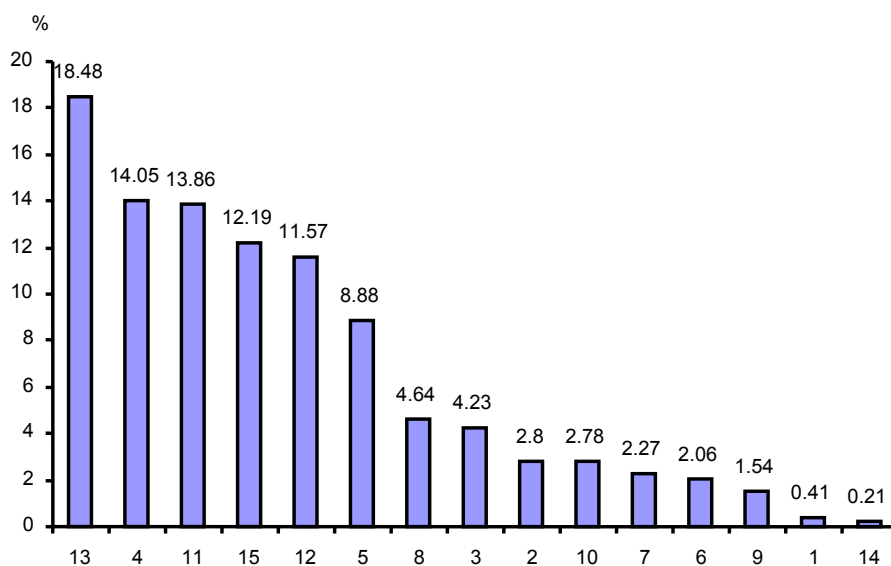


Fig. 3. Percentage of ecological groups 1-15; explanations p. 139
Ryc. 3. Procentowy udział grup ekologiczno siedliskowych 1-15; objaśnienia str. 139

of this habitat promotes the development of such species as *Arenaria serpyllifolia*, various sicklewort (*Coronilla varia*), sand cudweed (*Helichrysum arenarium*), common burdock (*Herniaria glabra*) (Fig. 3, Table 1). Over 4% out of the distinguished ecological groups is taken by group no. 3 with 20 species and group no. 9 with 22 species (Fig. 3). Most taxa from the group of reed and sedge rushes grow in the area of Piaski–Szczygliczka. Species found there include e.g. marsh sedge (*Carex acutiformis*), moneywort (*Lysimachia nummularia*), floating watercress (*Rorippa amphibia*), and common skullcap (*Scutellaria galericulata*) (Table 1). Species belonging to group no. 2 are scarce – 14, no. 6 – 10, no. 7 – 11, no. 9 – 7 and no. 10 – 13 species, respectively. The above mentioned groups account jointly for not more than 3% of all species (Fig. 3). A slight percentage is found for epilytic communities – represented by one species, i.e. snow on the mountain (*Euphorbia marginata*). Aquatic and spring vegetation is represented by only three species: white poplar (*Populus alba*) and lesser duckweed (*Lemna minor*) and *Spirodela polyrrhiza* which constitutes 0.41% (Fig. 3).

The conducted analysis of vascular flora in terms of light index indicates that over 75% species are heliophyllous plants, while 228 taxa (38.95%) prefer moderate light, such as meadow cress (*Cardamine pratensis*), blue fescue (*Festuca ovina*), common St. John's wort (*Hypericum perforatum*), whereas plants of full light include e.g. field bindweed (*Convolvulus arvensis*), common spurry (*Spergula arvensis*), coltsfoot (*Tussilago farfara*), field violet (*Viola arvensis*) – a total of 212 species (36.12%) (Fig. 4). Almost 17% of the entire flora prefers shady sites, out of which 75 species (12.79%) prefer semishade, e.g. bugle (*Ajuga reptans*), white mustard (*Sinapis alba*), mountain ash (*Sorbus aucuparia*). A total of 22 species (3.77%) inhabit sites of moderate shade, e.g. wood forget-me-not (*Myosotis sylvatica*), male fern (*Dryopteris filix-mas*), enchanter's nightshade (*Circaea lutetiana*), and only one species may withstand deep shade – three-nerved sandwort (*Moehringia trinervia*), which is a forest species (Fig. 4, Table 1).

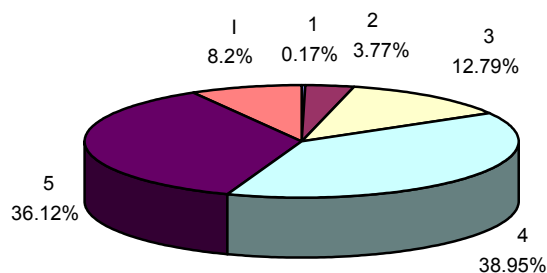


Fig. 4. Light indicator L: 1-5 values of the light indicator, I – plants without value of the light indicator
Ryc. 4. Wskaźnik świetlny L: 1-5 –wartości wskaźnika świetlnego, I – brak określonej wartości wskaźnika

In terms of the soil moisture index (Fig. 5, Table 1) a total of 290 species (43.40%) is found on fresh soils, e.g. wild strawberry (*Fragaria vesca*), meadow Gagea (*Gagea pratensis*), white dead-nettle (*Lamium album*), while in moist soils there are 144 taxa (21.56%), including fumewort (*Corydalis intermedia*), pilewort (*Ficaria verna*), meadow scabwort (*Inula britannica*), bird cherry (*Padus avium*).

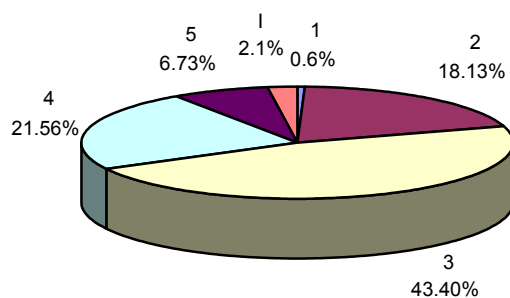


Fig. 5. Moisture indicator W: 1-5 – value of the indicator, I – plants without value of the moisture indicator
Ryc. 5. Wskaźnik wilgotności W: 1-5 wartości wskaźnika wilgotności, I – brak określonej wartości wskaźnika

The third index in terms of the number of species is index 2, i.e. dry soils, accounting for over 18%, e.g. grey hair-grass (*Corynephorus canescens*), triangle pink (*Dianthus deltoides*), common burstwort (*Herniaria glabra*), field clover (*Trifolium arvense*), spring speedweel (*Veronica verna*). All the above mentioned species may be found in dry swards of the Piaski–Szczygliczka reservoir.

Index 5, i.e. wet soils, accounts for a small percentage of species, amounting to 6.73%. It is represented by 45 species, e.g. black alder (*Alnus glutinosa*), slender tufted sedge (*Carex gracilis*), marsh marigold (*Caltha palustris*), and reed canary grass (*Phalaris arundinacea*). Only four species prefer very dry soils, e.g. *Acinos arvensis*, hard fescue (*Festuca trachyphylla*), sandy potentil (*Potentilla arenaria*), yellow stonecrop (*Sedum acre*) in contrast to fine-leaved water dropwort (*Oenanthe aquatica*), or simplestem bur-reed (*Sparganium erectum*), which have index 6, similarly as 13 other aquatic species.

Analysis of flora in terms of the trophism index (Fig. 6, Table 1) shows that the most numerous group of plants represents index 4 (rich soils). A total of 279 species belong to this group, amounting to 42.90%, including e.g. meadow foxtail (*Alopecurus pratensis*), *Carduus crispus*, carpenter's herb (*Prunella vulgaris*), wool mullein (*Verbascum densiflorum*). Index 3 (moderately poor soils) is also represented by a rather considerable number of species (34.55%), i.e. 225 species, e.g. sprickly sedge (*Carex spicata*), long pricklyhead poppy (*Papaver argemone*), sticky ragwort (*Senecio viscosus*), yellow salsify (*Tragopogon dubius*). Species of poor spoils are found in the Ostrów objects in small numbers (8.38%); however, in this type of sites one may find e.g. pale alyssum (*Alyssum alyssoides*), cheatgrass brome (*Bromus tectorum*), common whitlow grass (*Erophila verna*). The highest requirements i.e. index 5 (very abundant soils) are found for 36 species (5.52%), e.g. *Aliaria petiolata*, woolly burrlock (*Arctium tomentosum*), hop (*Humulus lupulus*), in contrast to hairy fingergrass (*Digitaria ischaemum*), yellow stonecrop (*Sedum acre*), which may grow on extremely poor soils (index 1), e.g. on railway tracks. Species of extremely poor soils constitute 0.73% of all the flora.

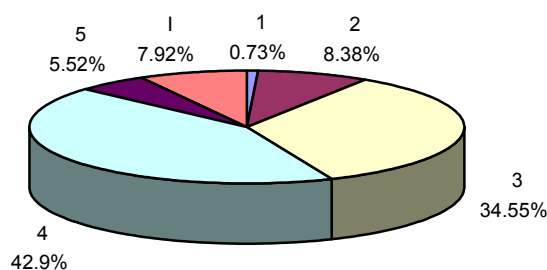


Fig. 6. Nitrogen indicator TR: 1-5 – value of the indicator, I – plants without value of the nitrogen indicator
 Ryc. 6. Wskaźnik trofizmu siedlisk TR: 1-5 – wartości wskaźnika trofizmu, I – brak określonej wartości wskaźnika

In terms of the percentage of hemeroby rate (Fig. 7, Table 1) the biggest number of species – 391 (41.87%) were reported in mesohemerobic sites e.g. garden angelica (*Angelica archangelica*), field woodrush (*Luzula campestris*), *Dathonia decumbens*. Species from euhemerobic sites are also represented in rather large numbers, i.e. 378 species (40.38%), such as e.g. annual wall rocket (*Diplotaxis muralis*), satinflower (*Lunaria annua*), creeping wood sorrel (*Oxalis corniculata*). Species found in sites with slight anthropopressure (oligohemerobic) are found scarcely (9.29%), e.g. moschatel (*Adoxa moschatellina*), *Galeopsis pubescens*, wall lettuce (*Mycelis muralis*), common dog violet (*Viola riviniana*). The smallest number of species – 51 (5.45%) is found in polyhemerobic sites, e.g. sticky ragwort (*Senecio viscosus*), yellow mignonette (*Reseda lutea*), Virginia pepperweed (*Lepidium virginicum*). Attention needs to be paid to species, which have a wide scope of tolerance in terms of hemeroby, e.g. Norway maple (*Acer platanoides*), meadow foxtail grass (*Alopecurus aequalis*), floating water cress (*Rorippa amphibia*), or common dandelion (*Taraxacum officinale*). These are species, which may be found in ecosystems, where human impact is slight and in those, where anthropopressure is very significant. In terms of the percentages of hemeroby degrees, a dominant effect of two of them was observed (Fig. 7).

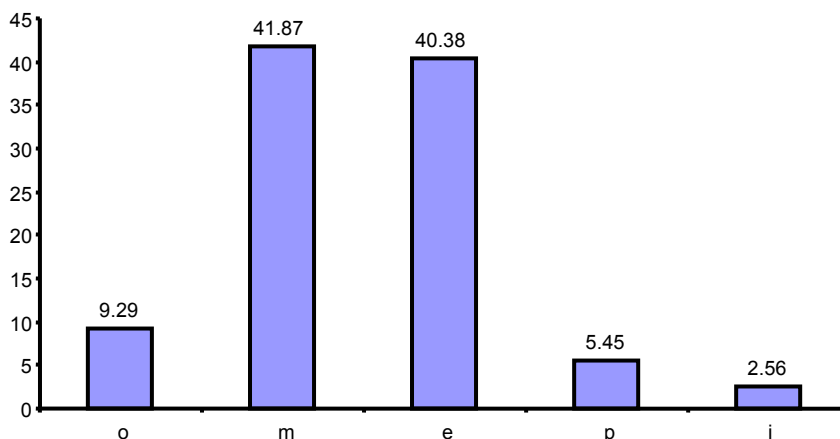


Fig. 7. Share of species with different hemeroby
Ryc. 7. Udział gatunków o różnym stopniu hemerobii

Conclusions

In selected objects of the town of Ostrów Wielkopolski the occurrence of 484 vascular plant species was found. The town is the refuge for plants covered by complete legal protection: *Angelica archangelica*, *Centaurium pulchellum*, *Galanthus nivalis*, *Lathyrus latifolius*, *Lilium martagon*, *Lycopodium clavatum*, *Matteucia struthiopteris*, *Ornithogalum nutans*, *Ornithogalum umbellatum*, *Sorbus intermedia* and under partial: *Convallaria majalis*, *Frangula alnus*, *Hedera helix*, *Helichrysum arenarium*, *Ononis arvensis*.

According to data published by **Żukowski** and **Jackowiak** (1995) for the Wielkopolska region, species *Matteucia struthiopteris*, *Acer campestre* and *Galanthus nivalis* needs to be considered rare and threatened with extinction. A separate group is composed of rare and phytogeographically interesting taxa: *Corydalis intermedia*, *Cruciata glabra*, *Populus nigra*, *Bunias orientalis*, *Cardamine hirsuta*, *Cerastium glomeratum*, *Chenopodium strictum*, *Diploxys muralis*, *Echinocystis lobata*, *Erysimum marschallianum*, *Lamium maculatum*, *Leontodon taraxacoides*, *Lepidium virginicum*, *Reynoutria japonica*, *Rorippa ×armoracioides*, *Rumex confertus*, *Viscum album* ssp. *austriacum*.

The flora of the town exhibits a high percentage of hemicryptophytes (225) and therophytes (150). A distinct predominance of indigenous species is observed (312) over alien species (167). In terms of socio-ecology the highest percentage was found for plants from ruderal, meadow and deciduous forest habitats. These three groups jointly include 162 species of the total flora. A vast majority of them belong to heliophytes (over 75%), 290 species are found in fresh soils and 144 in moist soils. Only four species are found on very dry soils. In terms of trophism index the dominant group are plants of rich soils (279 species).

It results from the conducted analysis of the scale of hemeroby that mesohemiorobic (391) and euhemiorobic (378) species are found in biggest numbers. It shows that in the selected objects anthropopressure is weak or periodical, and on the other hand human impact is strong and permanent. Vascular flora of the objects in Ostrów Wielkopolski

shows rather considerable diversity, which is connected with their functional character, as well as site conditions.

In terms of diversity especially Piaski–Szczygliczka (222 species) and railway tracks (191 species) are exceptionally rich; in the Evangelical cemetery 72 species were found (earlier studies by **Celka** and **Żywica** 2004 – 62 species), in the municipal cemetery at ulica Wrocławska – 59 species (**Celka** and **Żywica** 2004 reported 57 species), while in the municipal cemetery at ulica Limanowskiego – 38 species, respectively. A total of 54 species were reported in the years of the study for the landfill site.

Esthetic and landscape value of flora needs to be used in practice to a much higher degree, especially in town and country planning and in the protection and modelling of natural environment in urbanized areas.

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ROŚLINY NACZYNIOWE WYBRANYCH OBIEKTÓW MIASTA OSTRÓW WIELKOPOLSKI

S t r e s z c z e n i e

W pracy przedstawiono wyniki trzyletnich badań nad florą naczyniową miasta Ostrów Wielkopolski. W wyniku badań stwierdzono występowanie 484 gatunków należących do 82 rodzin i 282 rodzajów. Najliczniej reprezentowane są rodzaje: *Veronica*, *Rumex*, *Salix*, *Trifolium*, *Poa*. Ostrów Wlkp. jest ostoją 15 gatunków objętych ochroną całkowitą i częściową oraz 17 uznawanych za rzadkie i interesujące.

Na podstawie analizy statystycznej flory wykazano, że dominują hemikryptofity, ale znaczący udział mają również terofity. Dominującą grupę stanowią gatunki rodzimego pochodzenia (312) i antropofity (113). Najliczniej reprezentowane są gatunki zbiorowisk ruderalnych (18,48%) i roślinność łąkowa z 68 gatunkami. Zdecydowana większość, czyli ponad 75% gatunków, to rośliny światłolubne i preferujące umiarkowane światło (228). Z przedstawionej listy gatunków 290 występuje na glebach świeżych i zasobnych. Stwierdzono, że istniejąca antropopresja jest związana z bezpośrednim użytkowaniem roślinności. 391 gatunków zanotowano na siedliskach o stopniu mezohemorobnym, a 378 na siedliskach o stopniu euhemorobnym. Na terenie miasta odnotowano 11 pomników przyrody.

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