



## VASCULAR FLORA OF SELECTED PALACE PARKS IN THE WIELKOPOLSKA REGION

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**ABSTRACT.** The study presents vascular flora, both spontaneous and that coming from former and contemporary plantings found in five palace parks in the Wielkopolska region. Analyses were conducted in the years 2010–2013. A total of 612 vascular plant species were reported. In terms of the floristic composition the park in Wąsowo was the richest (335 species), while the park in Konarzewo was the poorest (133 species). Interesting plants occurring spontaneously in the analysed area include *Alisma ×rhinocarpum*, *Asperugo procumbens*, *Cardamine flexuosa*, *Cardamine hirsuta*, *Cerastium macrocarpum*, *Geranium molle*, *Monotropa hypophagea*, *Oxalis corniculata*, *Stellaria neglecta* and *Vicia dasycarpa*. The most interesting species grown or probably purposefully introduced to the parks include *Acanthus longifolius*, *Aegopodium podagraria* ‘Variegatum’, *Chaerophyllum aromaticum*, *Corydalis cava*, *Corydalis intermedia*, *Cymbalaria muralis*, *Euphorbia amygdaloides*, *Gagea minima*, *Geranium pyrenaicum*, *Geranium sanguineum*, *Gypsophilla paniculata*, *Helianthemum apenninum*, *Isopyrum thalictroides*, *Lithospermum purpureocaeruleum*, *Luzula luzuloides*, *Narcissus pseudonarcissus*, *Origanum vulgare*, *Ornithogalum nutans*, *Poa chaixii*, *Rudbeckia fulgida*, *Telekia speciosa* and *Viola cyanea*.

**KEY WORDS:** palace parks, flora, indices of flora synanthropization, Czarniejewo, Konarzewo, Obrzycko, Śmiełów, Wąsowo, Wielkopolska, Poland

### INTRODUCTION

Ornamental gardens were established at mansions in the Wielkopolska region starting from the 16<sup>th</sup> century. The turn of the 17<sup>th</sup> and 18<sup>th</sup> centuries was the period of their greatest development. The layout for first ornamental gardens, called Italian gardens, was based on geometrical figures and comprised compartments, terraces and hedges. These gardens were later replaced by French gardens of a regular arrangement, marked by espaliers, avenues, canals and cascades. English style parks appeared in the Wielkopolska region in the 1st half of the 17<sup>th</sup> century. Parks formed an inseparable whole with buildings. Their function was to isolate the mansion residents from the village and manor farm buildings, shelter them from winds and provide appropriate walking grounds for strolls. They were marked by an arbitrary arrangement of roads and paths, clusters of trees and shrubs, ponds,

canals, picturesque beauty spots, clearances and vistas. In the 2<sup>nd</sup> half of the 18<sup>th</sup> century Romantic parks came into fashion, characterised by picturesque open spaces, beautiful views, canals, ponds, various pavilions, sculptures and monuments. Initially English landscape designs were parts of Romantic parks, but with time the landscape function of parks was becoming increasingly important. Eventually landscape parks became predominant in palace park designs in the Wielkopolska region. Initially park plantings were destroyed and new ones were planted in their place. Only occasionally old plantings were left and the new landscape park was established outside it to constitute a whole. Exotic species of trees, shrubs and herbaceous plants were imported starting from the 19<sup>th</sup> century (MAJDECKI 2008).

Countryside parks, next to forest complexes, play an important role in Polish landscape. In many regions of the country they provide it with characteris-

Table 1. Characteristics of analysed palace parks

No.	Palace park	Area (ha)	Data of settle	Water	Meadow	Orchard	Actual usage	Source of information
1	Czarniejewo, community Czarniejewo, district Gniezno	13.00	1771–1775	pond	+	+	+	Antkowiak & Wojciechowska (2007)
2	Konarzewo, community Dopiewo, district Poznań	11.74	1689–1699	–	+	–	–	Czekalski (1999)
3	Obrzycko, community Obrzycko, district Szamotuły	19.00	1862	pond and Warta river	+	+	+	–
4	Śmiełów, community Żerków, district Jarocin	14.00	1795–1800	Lutynia river	+	+	+	Czekalski (2012)
5	Wąsowo, community Kuślin, district Nowy Tomyśl	49.50	1780–1786	pond, ditch	+	+	+	Rybarczyk (2014)

tic features and unique charm, always enhancing and supplementing its nature value (DRZAŁ & LESZCZYCKI 1974). Unfortunately, some palace and manor parks were partly devastated in the last century. This was primarily caused by the seizure of these landed properties after the end of WWII in 1945 by the State Treasury and their transformation into various public facilities, e.g. offices of state-owned farms, resorts and orphanages (SKRAJNA 2007, MARKUSZEWSKA 2008, BYKOWSKA 2014). The change of the originally intended use and a lack of tending operations enhanced transformations in the tree stands and vegetation cover leading to more natural plant communities (OLACZEK 1972). In turn, common access to some parks and in some cases their use inconsistent with their original function distorted these communities. Irrespective of the directions in the transformations of park vegetation in many park plantings we may find valuable showy trees of native and introduced species (CZEKALSKI 1978, SENETA 1989) as well as a rich flora of herbaceous species.

Most studies conducted in former manor parks concern their dendroflora (CZEKALSKI 1978, 1999,

2001, 2012, CZEKALSKI & KLIMASZEWSKA 2003, SIKORSKI & WYSOCKI 2003, WILBRANDT 2008, KUŁAK & SENETA 2012, KUCHARSKI & CHMIELNICKI 2014, KORSZUN & BYKOWSKA 2015). Only research conducted in recent years has supplied information on herbaceous plants (CZARNA 2007, SKRAJNA 2007, CZARNA et al. 2008, RATYŃSKA et al. 2008, 2009) and bryoflora (RUSIŃSKA 2008) of these interesting and valuable nature objects.

This floristic study concerns five park and palace complexes in the Wielkopolska region located in Czarniejewo, Konarzewo, Obrzycko, Śmiełów and Wąsowo (Fig. 1). Analysed objects were established in the 17<sup>th</sup> and 18<sup>th</sup> centuries. They range in area from 12 to 50 hectares. All the park and palace complexes currently represent the English style, although some of them had originally been designed in another style (e.g. the park in Czarniejewo was established in the French style; a part of the garden in Konarzewo was initially designed in the Italian style). The landscape character of these parks is strengthened by the presence of water reservoirs of various types as well as varied vegetation cover (Table 1). The aim of this study was to conduct a detailed survey and valuation of vascular flora, as well as determine the degree of flora synanthropization.

## MATERIAL AND METHODS

Floristic studies were conducted in the years 2010–2013. Species were recorded twice: in the spring and summer. Species nomenclature was adopted after MIREK et al. (2002), as well as ERHARDT et al. (2008) and GAWRYŚ (2008). Each species was evaluated according to the five-point frequency scale: 1 – very rare – scarce specimens; 2 – rare – relatively numerous specimens cover up to 5% park area; 3 – moderately frequent – numerous specimens cover 5–25% of the area; 4 – frequent – abundant specimens cover 25–50% of the area; 5 – very frequent (common) – abundant specimens cover over 50% of the area.

Analysis of flora comprised a characteristic of their life forms according to Raunkiaer after ERHARDT (2008), as well as ZARZYCKI et al. (2002) and RUTKOWSKI (2004). The geographical-historical spectrum

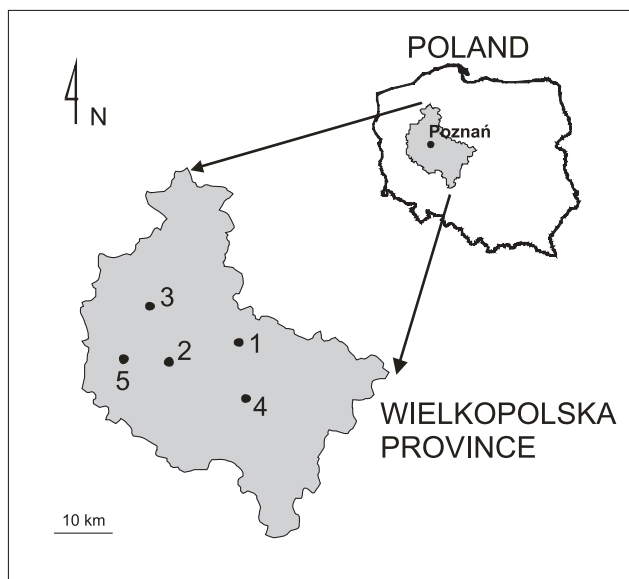


Fig. 1. Localization of analysed palace parks: 1 – Czarniejewo; 2 – Konarzewo; 3 – Obrzycko; 4 – Śmiełów; 5 – Wąsowo

was based on a study by RUTKOWSKI (2004) and CZARNA (2009). Protected species were verified based on the Regulation of the Minister of the Environment of 9 October 2014 (ROZPORZĄDZENIE... 2014). Based on the Red lists and books the status of species endangerment was established on the regional (JACKOWIAK et al. 2007) and the national levels (KAŹMIERCZAKOWA & ZARZYCKI 2001, ZARZYCKI & MIREK 2006). Dynamic trends for alien species were established after TOKARSKA-GUZIŁ et al. (2012). Coefficients of flora synanthropization were determined after JACKOWIAK (1990). They represent the percentage contribution of specific geographical-historical groups and were calculated with reference to the entire analysed flora. A list of formulas is given below. Used abbreviations mean: Sp – spontaneophytes; Ap – apophytes; Ar – archeophytes; Kn – kenophytes; ErW – ergasiophytes spreading vegetatively; ErgG – ergasiophytes spreading generatively; Ef – ephemeroophytes; N – the total species number.

The total synanthropization index specifies the share of synanthropic spontaneophytes in the entire flora:  $WS_c (\%) = (Ap + Ar + Kn + Ef) / N$ ; the permanent synanthropization index specifies the share of apophytes and established alien species in the permanent segment of flora:  $WS_t (\%) = (Ap + Ar + Kn + ErW + ErgG) / (Sp + Ap + Ar + Kn + ErW + ErgG)$ .

The total apophytism index specifies the share of apophytes in the total flora:  $WAp_c (\%) = Ap / N$ ; the permanent apophytism index represents the share of apophytes in the permanent segment of flora:  $WAp_t (\%) = Ap / (Sp + Ap + Ar + Kn + ErW + ErgG)$ .

The total anthropophytism index specifies the share of alien species in the entire flora:  $WAN_c (\%) = (Ar + Kn + Ef + ErgG + ErW + E0) / N$ ; the permanent anthropophytism index represents the share of established alien species in the permanent segment of flora:  $WAN_t (\%) = (Ar + Kn + ErW + ErgG) / (Sp + Ap + Ar + Kn)$ .

The total archeophytism index specifies the share of archeophytes in the total flora:  $WAr_c (\%) = Ar / N$ ; the permanent archeophytism index represents the percentage of archeophytes in the permanent segment of flora:  $WAr_t (\%) = Ar / (Sp + Ap + Ar + Kn + ErW + ErgG)$ .

The total kenophytism index specifies the share of kenophytes in the total flora:  $WKn_c (\%) = Kn / N$ ; the permanent kenophytism index gives the share of kenophytes in the permanent segment of flora:  $WKn_t (\%) = Kn / (Sp + Ap + Ar + Kn + ErW + ErgG)$ .

The index of flora modernization specifies the share of kenophytes in the flora of permanently established alien species:  $WM (\%) = Kn / (Kn + Ar + ErgG + ErW)$ .

The flora fluctuation index defines the share of ephemeroophytes in the total flora:  $WF (\%) = Ef / N$ .

The apophytism index for spontaneophytes specifies the percentage share of apophytes in the entire group of native species  $Wap (\%) = Ap / (Sp + Ap)$ .

Herbarium sheets were deposited at the Herbarium of the Poznań University of Life Sciences (POZNB).

## RESULTS

In the five palace parks a total of 612 vascular species were recorded. In the tree layer there were 71 species, in the shrub layer there were 120, while in the herbaceous layer there were 466 species, respectively (Table 2). The largest numbers of species were reported in the parks of Wąsowo (335) and Obrzycko (327), while the numbers were smallest in the parks in Konarzewo (133) and Śmiełowo (183). In the park in Czerniejewo a total of 268 species were recorded (Table 3).

In all the analysed parks very rare and rare species predominated markedly (Table 4). *Carpinus betulus* was a common species in the park in Czerniejewo. *Anemone nemorosa* and *Fagus sylvatica* are frequent species in Wąsowo.

Vascular plants in the palace parks are represented by 10 life forms (Table 5). Among life forms in all the parks the largest group was composed of hemi-cryptophytes (241 species), followed by megaphanerophytes (90) and annual plants (80). Interesting findings are the relatively large share of geophytes (63 species), as well as nanophanerophytes (68 species). Among geophytes a considerable share is reported for spring plants such as *Adoxa moschatellina*, *Allium ursinum*, *Anemone nemorosa*, *A. ranunculoides*, *Convallaria majalis*, *Corydalis cava*, *C. intermedia*, *Ficaria verna*, *Gagea arvensis*, *G. lutea*, *G. minima*, *G. pratensis*, *Galanthus nivalis*, *Isopyrum thalictroides*, *Lathraea squamaria*, *Lilium regale*, *Maianthemum bifolium*, *Muscari botryoides*, *Narcissus pseudonarcissus*, *Ornithogalum nutans*, *O. umbellatum*, *Paris quadrifolia*, *Petasites hybridus*, *Polygonatum multiflorum*, *Scilla sibirica* and *Tulipa fosteriana*.

Native plants (spontaneophytes and apophytes) account for almost 60% all species (Table 6). Depending on the park the share of these species ranged from 72 (the park in Konarzewo) to 241 (the park in Wąsowo). Among apophytes the following species were found in all the parks: *Acer platanoides*, *Aegopodium podagraria*, *Anemone nemorosa*, *Anthriscus sylvestris*, *Bellis perennis*, *Chaerophyllum temulum*, *Corylus avellana*, *Dactylis glomerata*, *Dryopteris filix-mas*, *Euonymus europaea*, *Fagus sylvatica*, *Fraxinus excelsior*, *Geum urbanum*, *Hedera helix*, *Lapsana communis*, *Plantago lanceolata*, *P. major*, *Poa nemoralis*, *Potentilla repens*, *Ranunculus repens*, *Rumex obtusifolia*, *Sambucus nigra*, *Sorbus aucuparia*, *Stellaria media*, *Taraxacum officinale*, *Veronica chamaedrys* and *V. sublobata*. Among alien species the most numerous represented are ergasiophytes (144 species), followed by kenophytes (56) and archeophytes (46). Only one species, *Lycopersicon esculentum*, represented ephemeroophytes. In the group of alien species there were taxa with marked invasive tendencies. Seven-

Table 2. A list of recorded vascular plant species in the analysed palace parks in Wielkopolska region

Taxa	Frequency scale					GHg	LF
	Cz	K	O	Ś	W		
The tree layer							
<i>Abies alba</i> Mill.	1 cul		1 cul		1 cul	ErW	M
<i>Abies concolor</i> (Gordon & Glend.) Lindl. ex Hildebr	1 cul		1 cul		1 cul	ErW	M
<i>Acer campestre</i> L.		1 cul		1 cul		Ap	M
<i>Acer negundo</i> L.		1 cul		1 cul		Kn	M
<i>Acer platanoides</i> L.	2 cul	1 cul	1 cul	1 cul	2 cul	Ap	M
<i>Acer pseudoplatanus</i> L.	2 cul	1 cul	2 cul		1 cul	Ap	M
<i>Acer pseudoplatanus</i> L. 'Atropurpureum'			1 cul			.	M
<i>Acer saccharinum</i> L.		1 cul				ErW	M
<i>Aesculus flava</i> Sol.		1 cul				ErW	M
<i>Aesculus hippocastanum</i> L.			2 cul	1 cul	1 cul	Kn	M
<i>Aesculus pavia</i> L.					1 cul	ErW	M
<i>Ailanthus altissima</i> (Mill.) Swingle	1 cul	1 cul	1 cul		1 cul	Kn	M
<i>Alnus glutinosa</i> (L.) Gaertn.	1		1		1	Ap	M
<i>Betula pendula</i> Roth	1 cul		1 cul		1 cul	Ap	M
<i>Carpinus betulus</i> L.	4 cul		1 cul	1 cul	1 cul	Sp	M
<i>Castanea sativa</i> Mill.				1 cul		ErW	M
<i>Crataegus pedicellata</i> Sarg.		1 cul				ErW	M
<i>Fagus sylvatica</i> 'Purpurea'		1 cul			1 cul	.	M
<i>Fagus sylvatica</i> L.	2 cul	1 cul	1 cul	1 cul	3 cul	Sp	M
<i>Fraxinus excelsior</i> 'Pendula'	1 cul	1 cul				.	M
<i>Fraxinus excelsior</i> L.	1 cul	1 cul	1 cul	1 cul	1 cul	Ap	M
<i>Gymnocladus dioica</i> K. Koch		1 cul				ErW	M
<i>Hedera helix</i> L.	1	1	1	1	1	Ap	Li
<i>Humulus lupulus</i> L.	2					Ap	H
<i>Juglans regia</i> L.					1	Kn	M
<i>Larix decidua</i> Mill.	2 cul	1 cul	1 cul		1 cul	ErG	M
<i>Liriodendron tulipifera</i> L.					1 cul	ErW	M
<i>Magnolia acuminata</i> L.			1 cul			ErW	M
<i>Magnolia kobus</i> DC.	1 cul					ErW	M
<i>Malus domestica</i> Borkh.	1 cul		2 cul	1 cul	1 cul	Kn	M
<i>Malus ×oxysepala</i> A. Czarna	1					Ap×Kn	M
<i>Metasequoia glyptostroboides</i> Hi & W.C. Cheng (L.) H. Karst.				1 cul		ErW	M
<i>Picea abies</i> L.	1 cul	1 cul	1 cul		1 cul	Kn	M
<i>Picea glauca</i> (Moench) Voss			1 cul			ErW	M
<i>Picea pungens</i> Engelm.	1 cul		1 cul		1 cul	ErW	M
<i>Pinus nigra</i> J.F. Arnold	1 cul		1 cul	1 cul	1 cul	ErW	M
<i>Pinus strobus</i> L.	1 cul	1 cul		1 cul		Kn	M
<i>Pinus sylvestris</i> L.	1 cul	2 cul	2 cul	1 cul		Ap	M
<i>Platanus ×hispanica</i> Mill. ex Münchh. 'Acerifolia'	1 cul	1 cul	1 cul		1 cul	ErW	M
<i>Platycladus orientalis</i> (L.) Franco	1 cul					ErW	M
<i>Populus alba</i> L.	1 cul		1 cul			Ap	M
<i>Populus ×canescens</i> (Aiton) Sm.	1 cul					Ap	M
<i>Populus nigra</i> L.				1 cul		Ap	M
<i>Populus tremula</i> L.					1 cul	Ap	M
<i>Prunus avium</i> (L.) L.				1 cul		Kn	M

Taxa	Frequency scale					GHg	LF
	Cz	K	O	Ś	W		
<i>Prunus cerasifera</i> Ehrh.	1 cul				1 cul	Kn	M
<i>Prunus domestica</i> L.				1 cul		ErW	M
<i>Pseudotsuga menziesii</i> (Mirb.) Franco	1 cul		2 cul	1 cul	1 cul	Kn	M
<i>Pyrus pyrastrer</i> (L.) Burgsd.	1 cul				1 cul	Kn	M
<i>Quercus petraea</i> (Matt.) Loeb.			1 cul		1 cul	Sp	M
<i>Quercus robur</i> L.	1 cul		1 cul	1 cul	1 cul	Ap	M
<i>Quercus rubra</i> L.	1 cul	1 cul	1 cul	1 cul	1 cul	Kn	M
<i>Robinia pseudoacacia</i> L.	2 cul	2 cul	2 cul	1 cul		Kn	M
<i>Salix ×sepulcralis</i> Simonk. 'Chrysocoma'	1 cul	1 cul	1 cul	1 cul		ErW	M
<i>Salix caprea</i> L.	1 cul					Ap	M
<i>Salix cinerea</i> L.	1 cul					Sp	M
<i>Sophora japonica</i> L.	1 cul	1 cul				ErW	M
<i>Sorbus aucuparia</i> L. emend. Hedl.	1 cul	1 cul	2 cul	1 cul	1 cul	Ap	M
<i>Sorbus intermedia</i> (Ehrh.) Pers.	1 cul	1 cul				ErW	M
<i>Taxodium distichum</i> (L.) Rich.	1 cul			1 cul		ErW	M
<i>Thuja occidentalis</i> L.	2 cul		1 cul	1 cul	1 cul	ErW	M
<i>Thuja plicata</i> Donn ex D. Don	1 cul					ErW	M
<i>Tilia cordata</i> Mill.	1 cul		1 cul		1 cul	Ap	M
<i>Tilia</i> 'Euchlora'			2 cul			ErW	M
<i>Tilia platyphyllos</i> Scop.	1 cul		1 cul	1 cul		Ap	M
<i>Tilia tomentosa</i> Moench			1 cul		1 cul	ErW	M
<i>Tsuga canadensis</i> (L.) Carrière	1 cul			1 cul		ErW	M
<i>Ulmus glabra</i> Huds.	1 cul		1 cul			Ap	M
<i>Ulmus laevis</i> Pall.					1 cul	Ap	M
<i>Ulmus minor</i> Mill. emend. Richens				1 cul	1	Ap	M
<i>Viscum album album</i> L.	1		1	1	1	Kn	Ch
<i>Viscum album austriacum</i> L. subsp. (Wiesb.) Vollm.				1		Kn	Ch
The shrub layer							
<i>Acer campestre</i> L.	2		1	1		Ap	M
<i>Acer negundo</i> L.	1	1	2			Kn	M
<i>Acer platanoides</i> L.	2	1	1	1		Ap	M
<i>Acer pseudoplatanus</i> L.	2		1			Ap	M
<i>Aesculus hippocastanum</i> L.			1	1		Kn	M
<i>Amelanchier spicata</i> (Lam.) K. Koch				1 cul		Kn	N
<i>Berberis thunbergii</i> DC.	1 cul		1 cul			ErW	N
<i>Berberis vulgaris</i> L.			1 cul	1 cul		Ap	N
<i>Buxus sempervirens</i> L.			1 cul	1 cul	1 cul	ErW	N
<i>Caragana arborescens</i> Lam.		1 cul				ErW	N
<i>Caragana frutex</i> (L.) K. Koch		1 cul		1 cul		ErW	N
<i>Carpinus betulus</i> L.		1 cul		1 cul		Sp	M
<i>Castanea sativa</i> Mill.		1 cul	1 cul			ErW	M
<i>Cercis siliquastrum</i> L.				1 cul		ErW	M
<i>Chaenomeles japonica</i> (Thunb.) Lindl. ex Spach	1 cul					ErW	N
<i>Chaenomeles speciosa</i> (Sweet) Nakai				1 cul		ErW	N
<i>Chaenomeles ×superba</i> (Frahm) Rehder				1 cul		ErW	N
<i>Chamaecyparis lawsoniana</i> (A. Murray) Parl.	1 cul					ErW	M
<i>Chamaecyparis nootkatensis</i> (D. Don.) Spach					1 cul	ErW	M

Taxa	Frequency scale					GHg	LF
	Cz	K	O	Ś	W		
<i>Chamaecyparis pisifera</i> (Siebold & Zucc.) Endl.			1 cul			ErW	M
<i>Clematis vitalba</i> L.		1 cul		1 cul		Kn	Li
<i>Colutea arborescens</i> L.		1 cul				ErW	N
<i>Cornus mas</i> L.		1 cul		1 cul		ErW	M
<i>Cornus sanguinea</i> L.		1			1	Ap	N
<i>Cornus sericea</i> L. emend. Murray				1 cul		ErW	N
<i>Corylus avellana</i> L.	1 cul	1 cul	1 cul	1 cul	1 cul	Sp	N
<i>Crataegus laevigata</i> (Poir.) DC.	1			1	1	Ap	M
<i>Crataegus monogyna</i> Jacq.	1		1	1	1	Ap	M
<i>Crataegus punctata</i> Jacq.				1 cul		ErW	M
<i>Elaeagnus angustifolia</i> L.		1 cul				ErW	N
<i>Euonymus europaea</i> L.	1	1	1	1	1	Ap	N
<i>Euonymus fortunei</i> (Turcz.) Hand.-Mazz.				1 cul		ErW	N
<i>Fagus sylvatica</i> L.			2 cul			Ap	M
<i>Fallopia aubertii</i> (L. Henry) Holub	1 cul					ErW	N
<i>Forsythia ×intermedia</i> Zabel	1 cul		1 cul			ErW	N
<i>Frangula alnus</i> Mill.			1			Sp	N
<i>Fraxinus excelsior</i> L.			1			Ap	M
<i>Ginkgo biloba</i> L.			1 cul			ErW	M
<i>Hamamelis mollis</i> Oliv. ex Forb. & Hemsl.			1 cul			ErW	N
<i>Hedera helix</i> L.		1	1	1	1	Ap	Li
<i>Humulus lupulus</i> L.	2		1		1	Ap	H
<i>Hydrangea macrophylla</i> (Thunb. ex Murray) Ser.					1 cul	ErW	N
<i>Juniperus chinensis</i> L.	1 cul					ErW	M
<i>Juniperus communis</i> L.					1 cul	Sp	N
<i>Juniperus sabina</i> L.	1 cul		1 cul			ErW	N
<i>Juniperus virginiana</i> L.	1 cul					ErW	M
<i>Juniperus ×pfitzeriana</i> (L. Späth) P.A. Schmidt	1 cul				1 cul	ErW	N
<i>Kerria japonica</i> (L.) DC.				1 cul		ErW	N
<i>Laburnum anagyroides</i> Medik.		1 cul				ErW	M
<i>Ligustrum vulgare</i> L.	1 cul	1 cul			1 cul	ErW	N
<i>Lonicera tatarica</i> L.	1 cul	1 cul				ErW	N
<i>Lonicera xylosteum</i> L.	1 cul			1 cul	1 cul	ErW	N
<i>Lycium barbarum</i> L.	1 cul			1 cul	1 cul	Kn	N
<i>Maclura pomifera</i> Schn.				1 cul		ErW	M
<i>Magnolia ×soulangiana</i> Soul.-Bod.					1 cul	ErW	M
<i>Mahonia aquifolium</i> (Pursh) Nutt.		1 cul	1 cul			ErW	N
<i>Malus ×purpurea</i> Rehder	1 cul		1 cul	1 cul		ErW	M
<i>Malus sieboldii</i> Rehder				1 cul		ErW	M
<i>Parthenocissus quinquefolia</i> (L.) Planch. in A. & C. DC.			1 cul		1 cul	ErW	N
<i>Parthenocissus tricuspidata</i> Planch.	1 cul				1 cul	ErW	N
<i>Philadelphus coronarius</i> L.	1 cul	1 cul	1 cul		1 cul	ErW	N
<i>Physocarpus opulifolius</i> Maxi.		1 cul				ErW	N
<i>Picea omorica</i> (Pančić) Purk.	1 cul					ErW	M
<i>Picea pungens</i> Englm.	1 cul		1 cul			ErW	M
<i>Pieris japonica</i> (Thunb.) D. Don.	1 cul				1 cul	ErW	N
<i>Pinus mugo</i> Turra	1 cul					ErW	N

Taxa	Frequency scale					GHg	LF
	Cz	K	O	Ś	W		
<i>Platycladus orientalis</i> (L.) Franco		1 cul				ErW	M
<i>Populus tremula</i> L.			1			Ap	M
<i>Prunus avium</i> (L.) L.		1		1	1	Sp	N
<i>Prunus cerasifera</i> Ehrh.	1 cul		1 cul	1 cul		Kn	M
<i>Prunus mahaleb</i> L.		1 cul		1 cul		Kn	M
<i>Prunus serotina</i> Ehrh.			1 cul	1 cul	1 cul	Kn	N
<i>Prunus spinosa</i> L.	2		1			Ap	N
<i>Ptelea trifoliata</i> L.		1 cul	1 cul			ErW	N
<i>Pyrus pyraister</i> (L.) Burgsd.	1					Kn	M
<i>Quercus rubra</i> L.			1			Kn	M
<i>Rhamnus cathartica</i> L.	1		1	1	1	Ap	M
<i>Rhododendron catawbiense</i> Michx.			1 cul			ErW	N
<i>Rhus typhina</i> L.					1 cul	ErW	M
<i>Ribes alpinum</i> L.	1 cul	1 cul		1 cul		ErW	N
<i>Ribes spicatum</i> E. Robson	1			1	1	Sp	N
<i>Ribes uva-crispa</i> L.	1					Kn	N
<i>Robinia pseudoacacia</i> L.	1		1		1	Kn	M
<i>Rosa canina</i> L.	1			1	1	Ap	N
<i>Rosa gallica</i> 'Plena' L.				1 cul		.	N
<i>Rosa spinosissima</i> L.				1 cul		ErW	N
<i>Rubus idaeus</i> L.			2 cul		1	Ap	Ch
<i>Rubus plicatus</i> Weihe & Nees				1		Sp	Ch
<i>Rubus schlacherii</i> Weihe ex Tratt.	1					Sp	N
<i>Rubus seebergensis</i> Pfuhl ex Sprib.			1			Sp	N
<i>Salix alba</i> L.	1				1	Ap	M
<i>Salix caprea</i> L.			1		1	Ap	M
<i>Salix cinerea</i> L.			2		1	Sp	N
<i>Salix fragilis</i> L.			1			Ap	N
<i>Salix triandra</i> L.			1			Ap	N
<i>Salix viminalis</i> L.			1			Ap	N
<i>Sambucus nigra</i> L.	1	1	2	1	1	Ap	M
<i>Sambucus racemosa</i> L.					1	Kn	N
<i>Sorbaria sorbifolia</i> (L.) A. Braun	1 cul	1 cul				ErW	N
<i>Sorbus aucuparia</i> L. emend. Hedl.				1		Ap	M
<i>Sorbus intermedia</i> (Ehrh.) Pers.			1 cul			ErW	M
<i>Spiraea ×vanhouttei</i> (Briot) Zabel	1 cul		2 cul	1 cul		ErW	N
<i>Spiraea alba</i> Du Roi				1 cul		ErW	N
<i>Spiraea chamaedryfolia</i> L. emend. Jacq.			1 cul			ErW	N
<i>Spiraea japonica</i> L. f.			1 cul		1 cul	ErW	N
<i>Symphoricarpos albus</i> (L.) S.F. Blake	1 cul	1 cul	1 cul		1 cul	ErW	N
<i>Syringa ×chinensis</i> Willd.				1 cul		ErW	N
<i>Syringa reticulata</i> (Blume) H. Hara	1					ErW	N
<i>Syringa vulgaris</i> L.	1 cul	1 cul	1 cul		1 cul	ErW	N
<i>Taxus baccata</i> L.	2 cul	1 cul	1 cul	1 cul	1 cul	Kn	N
<i>Taxus ×media</i> Rehder				1 cul		ErW	N
<i>Thuja occidentalis</i> L.		1 cul	1 cul	1 cul		ErW	M
<i>Tilia platyphyllos</i> Scop.	1			1		Ap	M

Taxa	Frequency scale					GHg	LF
	Cz	K	O	Ś	W		
<i>Tsuga canadensis</i> (L.) Carrière					1 cul	ErW	M
<i>Ulmus glabra</i> Huds.	1		1			Ap	M
<i>Ulmus minor</i> Mill. emend. Richens	1			1		Ap	M
<i>Viburnum lantana</i> L.		1 cul	1 cul			ErW	N
<i>Viburnum opulus</i> L.	1 cul					Sp	N
<i>Vitis riparia</i> Michx.				1 cul		ErW	N
<i>Weigela floribunda</i> (Willd.) DC.					1 cul	ErW	N
The herbaceous layer							
<i>Acanthus longifolius</i> Host non Poir.				1 cul		ErW	H
<i>Acer platanoides</i> L.	1					Ap	M
<i>Achillea millefolium</i> L. s.l.	1	1	1		1	Ap	G
<i>Adoxa moschatellina</i> L.			1	1	2	Sp	G
<i>Aegopodium podagraria</i> L.	1 cul	2 cul	2 cul	1 cul	1 cul	Ap	H
<i>Aegopodium podagraria</i> 'Variegatum'				1 cul		.	H
<i>Aethusa cynapium</i> L. s.l.	1				1	Ar	T1
<i>Agrimonia eupatoria</i> L.	1					Ap	H
<i>Agrostis capillaris</i> L.			1			Ap	H
<i>Agrostis gigantea</i> Roth	1				1	Ap	G
<i>Agrostis stolonifera</i> L.	1		1		1	Ap	H
<i>Ajuga reptans</i> L.	2			1	1	Sp	H
<i>Alcea rosea</i> L.			1 cul			ErG	H
<i>Alliaria petiolata</i> (M. Bieb.) Cavara & Grande	1		1	1	1	Ap	T2
<i>Alisma ×rhinocarpum</i> Scotsman					1 cul	Ap	Hel
<i>Allium oleraceum</i> L.					1	Ap	G
<i>Allium schoenoprasum</i> L.				1 cul		ErG	G
<i>Allium scorodoprasum</i> L.		1 cul				Ar	G
<i>Allium ursinum</i> L.			1 cul			Sp	G
<i>Allium vineale</i> L.		1	2		1	Ap	G
<i>Alopecurus pratensis</i> L.	1		1		1	Ap	H
<i>Alyssum saxatile</i> L.				1 cul		ErG	H
<i>Amaranthus retroflexus</i> L.					r	Kn	T1
<i>Anchusa arvensis</i> (L.) M. Bieb.			1			Ar	T1
<i>Anchusa officinalis</i> L.			1			Ap	H
<i>Anemone nemorosa</i> L.	1 cul	1 cul	1 cul	1 cul	3 cul	Sp	G
<i>Anemone ranunculoides</i> L.	1 cul	1 cul		1 cul	1 cul	Sp	G
<i>Anthoxanthum odoratum</i> L. s.s.	1			1	1	Ap	H
<i>Anthriscus cerefolium</i> (L.) Hoffm.		1 cul				Kn	T2
<i>Anthriscus sylvestris</i> (L.) Hoffm.	1	1	1	1	1	Ap	H
<i>Aquilegia ×hybrida</i> Hort.			1 cul	1		ErG	H
<i>Aquilegia vulgaris</i> L.			1 cul			Sp	H
<i>Arabidopsis thaliana</i> (L.) Heynh.				1		Ap	T1
<i>Arabis alpina</i> L.				1 cul		ErW	H
<i>Arctium minus</i> (Hill.) Bernh.	1					Ap	T2
<i>Arctium tomentosum</i> Mill.	1	1			r	Ap	T2
<i>Arenaria serpyllifolia</i> L.	1	1	1		1	Ap	T1
<i>Armoracia rusticiana</i> P. Gaertn., B. Mey. & Schreb					1 cul	Ar	H
<i>Arrhenatherum elatius</i> (L.) P. Beauv. ex J. Presl & C. Presl	1	1	1		1	Ap	H



Taxa	Frequency scale					GHg	LF
	Cz	K	O	Ś	W		
<i>Artemisia absinthium</i> L.				1 cul		Ar	H
<i>Artemisia campestris</i> L.			1			Ap	H
<i>Artemisia vulgaris</i> L.	1	1	1	1		Ap	H
<i>Aruncus sylvestris</i> Kostel.			1 cul			Sp	H
<i>Asperugo procumbens</i> L.				1		Ar	T1
<i>Aster novae-angliae</i> L.			1 cul			ErW	H
<i>Aster novi-belgii</i> L.			1 cul			ErW	H
<i>Astragalus glycyphyllos</i> L.		1			r	Ap	H
<i>Athyrium filix-femina</i> (L.) Roth					1	Sp	H
<i>Atriplex patula</i> L.	1				1	Ap	T1
<i>Aubrieta</i> × <i>cultorum</i> Bergmans	1 cul			1		ErW	H
<i>Avenula pubescens</i> (Huds.) Dumort.			1			Ap	H
<i>Ballota nigra</i> L.	1	1	1		1	Ar	H
<i>Begonia semperflorens</i> Link et Otto			1 cul			Er1	T1
<i>Bellis perennis</i> L.	1	1	1	1	1	Ap	H
<i>Bergenia cordifolia</i> (Haw.) Sternb.			1 cul	1 cul	1 cul	ErW	H
<i>Berula erecta</i> (Huds.) Coville			1			Sp	Hel
<i>Berteroa incana</i> (L.) DC.			1		1	Ap	T2
<i>Betonica officinalis</i> L.			1 cul			Sp	H
<i>Bidens cernua</i> L.					1	Sp	T1
<i>Bidens frondosa</i> L.			1		1	Kn	T1
<i>Brachypodium sylvaticum</i> (Huds.) P. Beauv.			1		1	Sp	H
<i>Bromus carinatus</i> Hook. & Arn.		1			1	Kn	H
<i>Bromus inermis</i> Leyss.		1			1	Ap	G
<i>Bromus sterilis</i> L.	1	1	1			Ar	T2
<i>Bromus tectorum</i> L.	1				1	Ar	T2
<i>Bryonia alba</i> L.		1 cul				Kn	G
<i>Calamagrostis epigejos</i> (L.) Roth	1		1		1	Ap	G
<i>Callitriche verna</i> L. emend. Lönnr. s.s.			1			Ap	Hyd
<i>Calystegia sepium</i> (L.) R. Br.			1			Ap	G
<i>Campanula patula</i> L. s.s.			1			Ap	H
<i>Campanula rapunculoides</i> L.			1 cul		1 cul	Ap	H
<i>Campanula rotundifolia</i> L.					1	Ap	H
<i>Campanula trachelium</i> L.					1 cul	Ap	H
<i>Capsella bursa-pastoris</i> (L.) Medik.	1		1		1	Ar	T1
<i>Cardamine dentata</i> Schult.			1			Sp	H
<i>Cardamine flexuosa</i> With.					1	Sp	H
<i>Cardamine hirsuta</i> L.			1		r	Ap	T1
<i>Cardamine pratensis</i> L.			1		1	Sp	H
<i>Cardaminopsis arenosa</i> (L.) Hayek			1	1	1	Ap	H
<i>Carduus crispus</i> L.				1		Ap	T2
<i>Carex acutiformis</i> Ehrh.	1				1	Sp	H
<i>Carex digitata</i> L.					r	Sp	H
<i>Carex echinata</i> Murray					r	Sp	H
<i>Carex hirta</i> L.			1		1	Ap	G
<i>Carex ovalis</i> Gooden.					1	Ap	H
<i>Carex pallescens</i> L.					1	Sp	H

Taxa	Frequency scale					GHg	LF
	Cz	K	O	Ś	W		
<i>Carex pilulifera</i> L.					1	Sp	H
<i>Carex praecox</i> Schreb.				1		Ap	G
<i>Carex remota</i> L.					1	Sp	H
<i>Carex riparia</i> Curtis	1				1	Sp	H
<i>Carex spicata</i> Huds.	1	1		1	1	Ap	H
<i>Carex sylvatica</i> Huds.					1	Sp	H
<i>Carex vulpina</i> L.					1	Ap	H
<i>Carpinus betulus</i> L.	1					Sp	M
<i>Centaurea jacea</i> L.	1					Ap	H
<i>Centaureum erythraea</i> Rafn					r	Ap	T2
<i>Cerastium arvense</i> L. s.s.		1	1			Ap	H
<i>Cerastium biebersteinii</i> DC.			1 cul	1 cul		ErW	H
<i>Cerastium glomeratum</i> Thuill.			1			Ap	Ch
<i>Cerastium holosteoides</i> Fr. emend. Hyl.	1	1	1		1	Ap	Ch
<i>Cerastium macrocarpum</i> Schur emend. Gartner				1		Sp	Ch
<i>Cerastium semidecandrum</i> L.			1	1		Ap	T2
<i>Ceratophyllum demersum</i> L.	2					Sp	Hyd
<i>Chaerophyllum aromaticum</i> L.					1 cul	Ap	H
<i>Chaerophyllum temulum</i> L.	2	1	1	1	1	Ap	T2
<i>Chamaenerion angustifolium</i> Lam.					1	Ap	H
<i>Chamomilla suaveolens</i> (Pursh) Rydb.			1		1	Kn	T1
<i>Chelidonium majus</i> L.	1	1	1		1	Ap	H
<i>Chenopodium album</i> L.			1		1	Ap	T1
<i>Chenopodium hybridum</i> L.	1				r	Ar	T1
<i>Chrysosplenium alternifolium</i> L.	1				1	Sp	H
<i>Cichorium inthybus</i> L.	1				1	Ar	H
<i>Circaea lutetiana</i> L.			1		1	Sp	G
<i>Cirsium arvense</i> (L.) Scop.	1		1		r	Ap	G
<i>Cirsium oleraceum</i> (L.) Scop.					r	Ap	H
<i>Cirsium palustre</i> (L.) Scop.					r	Sp	H
<i>Cirsium vulgare</i> (Savi) Ten.	1				r	Ap	T2
<i>Convallaria majalis</i> L.			2 cul	1 cul	1 cul	Sp	G
<i>Convolvulus arvensis</i> L.	1	1	1			Ap	G
<i>Conyza canadensis</i> (L.) Cronquist	1		1		1	Kn	T1
<i>Coronilla varia</i> L.	1	1				Ap	H
<i>Corydalis cava</i> Schweigg. & Körte				1 cul		Sp	G
<i>Corydalis intermedia</i> (L.) Mérat	1 cul					Sp	G
<i>Crepis capillaris</i> (L.) Wallr.	1		1		1	Ap	T2
<i>Crepis tectorum</i> L.	1		1			Ap	T1
<i>Crocus vernus</i> (L.) Hill					1 cul	ErW	G
<i>Cymbalaria muralis</i> P. Gaertn., B. Mey. & Schreb.				1 cul		Kn	H
<i>Cynoglossum officinale</i> L.					1	Kn	H
<i>Dactylis glomerata</i> L.	1	2	1	1	1	Ap	H
<i>Dactylis polygama</i> Horv.	2		2	1	1	Sp	H
<i>Daucus carota</i> L.	1				r	Ap	T2
<i>Deschampsia caespitosa</i> (L.) P. Beauv.	1		1	1	1	Ap	H
<i>Deschampsia flexuosa</i> (L.) Trin.					1	Sp	H

Taxa	Frequency scale					GHg	LF
	Cz	K	O	Ś	W		
<i>Dianthus barbatus</i> L. s.s.				1 cul		ErG	C
<i>Dianthus chinensis</i> L.			1 cul			Er1	T1
<i>Digitaria ichaemum</i> (Schreb.) H.L. Mühl.			1			Ar	T1
<i>Dryopteris carthusiana</i> (Vill.) H.P. Fuchs	1		1		1	Ap	H
<i>Dryopteris dilatata</i> (Hoffm.) A. Gray			1			Sp	H
<i>Dryopteris filix-mas</i> (L.) Schott	1	1	1	1	1	Ap	H
<i>Echinacea purpurea</i> (L.) Moench			1 cul			ErG	H
<i>Echinochloa crus-galli</i> (L.) P. Beauv.					r	Ar	T1
<i>Echinocystis lobata</i> (F. Michx.) Torr. & A. Gray			1		1	Kn	T1
<i>Echinops sphaerocephalus</i> L.				1 cul		Kn	H
<i>Echium vulgare</i> L.			1	1 cul		Ap	T2
<i>Elymus repens</i> (L.) Gould	1	1			1	Ap	G
<i>Epilobium adnatum</i> Griseb			1			Ap	H
<i>Epilobium ciliatum</i> Raf.					1	Kn	H
<i>Epilobium collinum</i> Raf.			1			Ap	H
<i>Epilobium hirsutum</i> L.	1				1	Ap	H
<i>Epilobium montanum</i> L.					r	Sp	H
<i>Epilobium parviflorum</i> Schreb.	1		1			Sp	H
<i>Epilobium roseum</i> Schreb.			1			Sp	H
<i>Epipactis helleborine</i> (L.) Crantz			1		1	Ap	G
<i>Equisetum arvense</i> L.	1		1		1	Ap	G
<i>Eragrostis minor</i> Host	1		1		1	Kn	T1
<i>Erigeron annuus</i> (L.) Pers.			1 cul	1 cul	1 cul	Kn	T2
<i>Erodium cicutarium</i> (L.) L'Hér.	1		1		r	Ap	T1
<i>Erophila verna</i> (L.) Chevall.	1		1			Ap	T1
<i>Erysimum cheiranthoides</i> L.				1		Ap	T1
<i>Euonymus europaea</i> L.			1		1	Ap	N
<i>Eupatorium cannabinum</i> L.					1	Sp	H
<i>Euphorbia amygdaloides</i> L.			1 cul			ErW	C
<i>Euphorbia cyparissias</i> L.			1		1 cul	Ap	H
<i>Euphorbia esula</i> L.			1 cul			Ap	H
<i>Euphorbia peplus</i> L.			1			Ar	T1
<i>Fagus sylvatica</i> L.	1		1			Ap	M
<i>Fallopia convolvulus</i> (L.) Á. Löve			1		1	Ar	T1
<i>Fallopia dumetorum</i> (L.) Holub			1		1	Ap	T1
<i>Festuca arundinacea</i> Schreb.	1				1	Ap	H
<i>Festuca gigantea</i> (L.) Vill.			1		1	Ap	H
<i>Festuca rubra</i> L. s.s.	1	1	1		1	Ap	H
<i>Festuca trachyphylla</i> (Hack.) Krajina	1			1	1	Ap	H
<i>Ficaria verna</i> Huds.	1	1		1	1	Ap	G
<i>Filipendula ulmaria</i> (L.) Maxim.	1			1	1	Sp	H
<i>Filipendula vulgaris</i> Moench			1			Ap	H
<i>Fragaria moschata</i> Duchense		1 cul		1 cul		Sp	H
<i>Fragaria vesca</i> L.	1				1	Ap	H
<i>Fraxinus excelsior</i> L.	1					Ap	M
<i>Gagea arvensis</i> (Pers.) Dumort.		1 cul				Ar	G
<i>Gagea lutea</i> (L.) Ker Gawl.	1 cul	2 cul	2 cul	1 cul		Sp	G

Taxa	Frequency scale					GHg	LF
	Cz	K	O	Ś	W		
<i>Gagea minima</i> (L.) Ker Gawl.	1 cul			1 cul		Ap	G
<i>Gagea pratensis</i> (Pers.) Dumort.	1 cul	1 cul	1 cul		1	Ap	G
<i>Galanthus nivalis</i> L.	1 cul			1 cul		Sp	G
<i>Galeobdolon argentatum</i> (Smejkal) Henker ex G.H. Loos			1 cul	1 cul		ErG	H
<i>Galeobdolon luteum</i> Huds.	1		2 cul		1	Sp	H
<i>Galeopsis pubescens</i> Besser	1					Ap	T1
<i>Galeopsis tetrahit</i> L.	1		2			Ap	T1
<i>Galinsoga ciliata</i> Schreb.	1				1	Kn	T1
<i>Galinsoga parviflora</i> (Raf.) S.F. Blake	1		1		1	Kn	T1
<i>Galium aparine</i> L.		1	1	1	1	Ap	T1
<i>Galium mollugo</i> L.	1		1		1	Ap	H
<i>Galium odoratum</i> (L.) Scop.				1 cul	1 cul	Sp	H
<i>Galium palustre</i> L.			1		1	Ap	H
<i>Galium verum</i> L. s.s.	1		1			Ap	H
<i>Galium verum</i> × <i>G. mollugo</i>			1			Ap	H
<i>Geranium macrorrhizum</i> L.			1 cul			ErW	H
<i>Geranium molle</i> L.	1	1	1		1	Ar	T1
<i>Geranium platypetalum</i> Fisch. et Mey.			1 cul			ErW	H
<i>Geranium pusillum</i> Burm. f. ex L.	1	1	1			Ar	T1
<i>Geranium pyrenaicum</i> Burm. f.					r cul	Kn	H
<i>Geranium robertianum</i> L.	2	2	1	1	1	Ap	T1
<i>Geranium sanguineum</i> L.			1 cul			Sp	H
<i>Geum urbanum</i> L.	1	1	1	1	1	Ap	H
<i>Glechoma hederacea</i> L.	2	1			1	Ap	H
<i>Glyceria fluitans</i> (L.) R. Br.			1			Ap	Hel
<i>Glyceria maxima</i> (Hartm.) Holmb.	2				1	Sp	Hel
<i>Gypsophilla paniculata</i> L.				1 cul		ErG	H
<i>Hedera helix</i> L.	1 cul	1 cul	1 cul	1 cul	1 cul	Ap	Li
<i>Helianthemum apenninum</i> (L.) Mill.			1 cul			ErW	Ch
<i>Helichrysum arenarium</i> (L.) Moench			1			Ap	H
<i>Heliopsis scabra</i> Dunal			1 cul			ErW	H
<i>Hemerocallis fulva</i> L.			1 cul			ErW	G
<i>Hepatica nobilis</i> Schreb.					1 cul	Sp	H
<i>Heracleum sphondylium</i> L. s.l.	1				r	Ap	H
<i>Hieracium murorum</i> L.					1	Sp	H
<i>Hieracium pilosella</i> L.	1	1	1		1	Ap	H
<i>Hieracium sabaudum</i> L.	1				1	Sp	H
<i>Holcus lanatus</i> L.			1		r	Ap	H
<i>Hosta fortuneii</i> (Baker) L.H. Bailey			1 cul			ErW	H
<i>Hottonia palustris</i> L.					1	Sp	Hyd
<i>Hydrocharis morsus-ranae</i> L.	1					Sp	Hyd
<i>Hypericum perforatum</i> L.	1	1	1		1	Ap	H
<i>Hypochoeris radicata</i> L.	1		1		1	Ap	H
<i>Iberis sempervirens</i> L.			1 cul			ErW	Ch
<i>Impatiens parviflora</i> DC.	1	1	1			Kn	T1
<i>Iris germanica</i> L.				1 cul		ErW	H
<i>Iris pseudacorus</i> L.	1			1	1	Sp	Hel

Taxa	Frequency scale					GHg	LF
	Cz	K	O	Ś	W		
<i>Iris sibirica</i> L.			1 cul	1 cul		Sp	H
<i>Isopyrum thalictroides</i> L.		1 cul				Sp	G
<i>Juncus articulatus</i> L. emend. K. Richt.					1	Ap	H
<i>Juncus bufonius</i> L.					1	Ap	T1
<i>Juncus effusus</i> L.			1		1	Ap	H
<i>Kanutia arvensis</i> (L.) J.M. Coult.			1			Ap	H
<i>Lactuca serriola</i> L.					1	Ar	T2
<i>Lamium album</i> L.	1 cul		1 cul			Ar	H
<i>Lamium maculatum</i> L.			2 cul	1 cul		Ap	H
<i>Lamium purpureum</i> L.	1	1	1	1	1	Ar	T1
<i>Lapsana communis</i> L. s.s.	1	1	1	1	1	Ap	T1
<i>Lathraea squamaria</i> L.					1	Sp	G
<i>Lathyrus pratensis</i> L.	1		1		1	Ap	H
<i>Lathyrus vernus</i> (L.) Bernh.					1	Sp	G
<i>Lavendula angustifolia</i> Mil.			1 cul		1 cul	ErW	Ch
<i>Lemna minor</i> L.	1		1		1	Ap	Hyd
<i>Leontodon autumnalis</i> L.	1		1		1	Ap	H
<i>Leontodon hispidus</i> L.	1					Ap	H
<i>Leontodon taraxacoides</i> (Vill.) Mérat	1					Ap	H
<i>Leonurus cardiaca</i> L.		1 cul				Ar	H
<i>Lepidum densiflorum</i> Schrad.	1					Kn	T1
<i>Leucanthemum maximum</i> (Ramond) DC.			1 cul			ErW	H
<i>Leucanthemum vulgare</i> Lam. s.s.	1 cul		1 cul			Ap	H
<i>Lilium regale</i> E.H. Wilson			1 cul			ErW	G
<i>Linaria vulgaris</i> Mill.			1			Ap	G
<i>Lithospermum purpureocaeruleum</i> L.			1 cul			Sp	H
<i>Lolium multiflorum</i> Lam.					1	Kn	H
<i>Lolium perenne</i> L.	1	1			1	Ap	H
<i>Lotus corniculatus</i> L.	1		1		1	Ap	H
<i>Lotus uliginosus</i> Schkuhr			1		1	Sp	H
<i>Lunaria annua</i> L.			1 cul	1 cul		Kn	T2
<i>Lupinus polyphyllus</i> Lindl.			1			Kn	H
<i>Luzula campestris</i> (L.) DC.	1		1	1	1	Ap	H
<i>Luzula luzuloides</i> (Lam.) Dandy & Wilmott					1 cul	Sp	H
<i>Luzula pilosa</i> (L.) Willd.					1	Sp	H
<i>Lychnis flos-cuculi</i> L.					1	Sp	H
<i>Lycopersicum esculentum</i> Mill.					r	Ef	T1
<i>Lycopus europaeus</i> L.	1		1		1	Ap	Hel
<i>Lysimachia nummularia</i> L.			1 cul	1	1	Ap	H
<i>Lysimachia punctata</i> L.				1 cul		ErG	H
<i>Lysimachia vulgaris</i> L.	1		1		1	Ap	H
<i>Lythrum salicaria</i> L.			1		1	Sp	H
<i>Maianthemum bifolium</i> (L.) F.W. Schmidt			1		1	Sp	G
<i>Malva neglecta</i> Wallr.	1	1	1			Ar	T2
<i>Malva pusilla</i> Sm.	1					Ar	T2
<i>Matricaria maritima</i> subsp. <i>inodora</i> (L.) Dostál				1	1	Ar	T1
<i>Matteucia struthiopteris</i> (L.) Tod.			1 cul	1 cul		ErW	H

Taxa	Frequency scale					GHg	LF
	Cz	K	O	Ś	W		
<i>Medicago falcata</i> L.					r	Ap	H
<i>Medicago lupulina</i> L.	1		1			Ap	H
<i>Medicago sativa</i> L. s.s.					r	Kn	H
<i>Medicago</i> × <i>varia</i> Martyn					r	Ap×Kn	H
<i>Melampyrum nemorosum</i> L.					1	Ap	T1
<i>Melandrium album</i> (Mill.) Garcke	1	1	1		1	Ap	H
<i>Melica nutans</i> L.					1	Sp	H
<i>Melica uniflora</i> Retz.					1 cul	Sp	H
<i>Melissa officinalis</i> L.			1 cul		1	ErW	H
<i>Mentha aquatica</i> L.	1				1	Sp	Hel
<i>Mentha arvensis</i> L.					1	Ap	G
<i>Milium effusum</i> L.			1	1	1	Sp	H
<i>Moehringia trinervia</i> (L.) Clairv		1	1	1	1	Ap	H
<i>Monotropa hypophagea</i> Wallr.					r	Sp	G
<i>Muscari botryoides</i> (L.) Mill.				1 cul		ErG	G
<i>Mycelis muralis</i> (L.) Dumort.	1		1		1	Ap	H
<i>Myosotis arvensis</i> (L.) Hill	1	1	1		1	Ar	T1
<i>Myosotis palustris</i> (L.) L. emend. Rchb.	1		1		1	Sp	H
<i>Myosotis sparsiflora</i> Pohl				1		Ap	T2
<i>Myosotis stricta</i> Link ex Roem. & Schult.	1		1			Ap	T1
<i>Myosotis sylvatica</i> Ehrh. ex Hoffm.			1 cul			Kn	T2
<i>Myosoton aquaticum</i> (L.) Moench	1				1	Ap	H
<i>Narcissus pseudonarcissus</i> L.					1 cul	ErW	G
<i>Oenothera biennis</i> L. s.s.			1			Ap	T2
<i>Onopordon acanthium</i> L.				r cul		Ar	T2
<i>Origanum vulgare</i> L.			1 cul			Ap	H
<i>Ornithogalum nutans</i> L.		2 cul				ErG	G
<i>Ornithogalum umbellatum</i> L.	1 cul	1 cul	1 cul	1 cul		Kn	G
<i>Oxalis acetosella</i> L.			1		1	Sp	H
<i>Oxalis corniculata</i> L.			1			ErG	H
<i>Oxalis fontana</i> Bunge	1		1		1	Kn	G
<i>Paeonia officinalis</i> L.			1 cul			ErW	H
<i>Papaver orientale</i> L.				1 cul		ErW	H
<i>Papaver rhoeas</i> L.			1			Ar	T1
<i>Paris quadrifolia</i> L.					1	Sp	G
<i>Pastinaca sativa</i> L. s.s.					r	Ap	H
<i>Petasites hybridus</i> (L.) P. Gaertn., B. Mey. & Scherb.				1 cul		ErW	G
<i>Phalaris arundinacea</i> var. <i>arundinacea</i> L.	1		1	1	1	Ap	H
<i>Phalaris arundinacea</i> var. <i>picta</i> L.				1 cul		.	H
<i>Phleum pratense</i> L.	1				1	Ap	H
<i>Phlox paniculata</i> L.			1 cul			ErW	H
<i>Phlox subulata</i> L.			1 cul			ErW	H
<i>Phragmites australis</i> (Cav.) Trin. ex Steud.	1			1	1	Ap	Hel
<i>Phyteuma spicatum</i> L.					1	Sp	H
<i>Piciris hieracioides</i> L.	1				r	Ap	H
<i>Pimpinella nigra</i> Mill.	1					Ap	H
<i>Pimpinella saxifraga</i> L.	1					Ap	H
<i>Plantago lanceolata</i> L.	1	1	1	1	1	Ap	H

Taxa	Frequency scale					GHg	LF
	Cz	K	O	Ś	W		
<i>Plantago major</i> L. s.s.	1	1	1	1	1	Ap	H
<i>Plantago media</i> L.					r	Ap	H
<i>Poa annua</i> L.	1	1	1		1	Ap	T1
<i>Poa chaixii</i> Vill. s.s.					1 cul	Sp	H
<i>Poa compressa</i> L.			1		1	Ap	H
<i>Poa nemoralis</i> L.	1	1	2	1	1	Sp	H
<i>Poa palustris</i> L.			1			Sp	H
<i>Poa pratensis</i> L. s.s.	2	1	1			Ap	H
<i>Poa subcaerulea</i> Sm.			1			Ap	H
<i>Poa trivialis</i> L.	1	1				Ap	H
<i>Polygonatum multiflorum</i> (L.) All.			1 cul	1 cul	1 cul	Sp	G
<i>Polygonum amphibium</i> f. <i>terrestre</i> L. f. Leyss.	1					Ap	G
<i>Polygonum aviculare</i> L.	1		1		1	Ap	T1
<i>Polygonum minus</i> Huds.			1			Ap	T1
<i>Polygonum persicaria</i> L.	1		1			Ap	T1
<i>Potentilla anserina</i> L.				1	1	Ap	H
<i>Potentilla argentea</i> L. s.s.			1			Ap	H
<i>Potentilla recta</i> L.		1				Ap	H
<i>Potentilla reptans</i> L.	1	1	1	1	1	Ap	H
<i>Potentilla supina</i> L.					1	Ap	T1
<i>Primula veris</i> L.				1 cul	1 cul	Ap	H
<i>Primula vulgaris</i> Huds.			1 cul			ErG	H
<i>Prunella vulgaris</i> L.	1		1		1	Ap	H
<i>Pulmonaria obscura</i> Dumort.					1	Sp	H
<i>Quercus robur</i> L.	1					Ap	M
<i>Quercus rubra</i> L.	1					Kn	M
<i>Ranunculus acris</i> L. s.s.	1		1	1	1	Ap	H
<i>Ranunculus auricomus</i> L. s.l.				1		Sp	H
<i>Ranunculus bulbosus</i> L.		1	1			Ap	H
<i>Ranunculus lanuginosus</i> L.					1 cul	Sp	H
<i>Ranunculus repens</i> L.	1	1	1	1	1	Ap	H
<i>Ranunculus sceleratus</i> L.					1	Ap	T1
<i>Reynoutria japonica</i> Houtt.			1 cul		1 cul	ErW	G
<i>Rheum rhabarbarum</i> L.				1 cul		ErW	H
<i>Rorippa palustris</i> (L.) Besser					1	Ap	H
<i>Rubus caesius</i> L.	2		2	1	1	Ap	Ch
<i>Rubus nessensis</i> Hall					1	Sp	Ch
<i>Rudbeckia fulgida</i> Aiton			1 cul			ErW	H
<i>Rumex acetosa</i> L.	1			1	1	Ap	H
<i>Rumex acetosella</i> L.			1		1	Ap	G
<i>Rumex crispus</i> L.	1	1	1		1	Ap	H
<i>Rumex maritimus</i> L.					1	Ap	T1
<i>Rumex obtusifolius</i> L.	1	1	1	1	1	Ap	H
<i>Rumex thyrsiflorus</i> Fingerh.	1		1			Ap	H
<i>Sagina procumbens</i> L.	1					Ap	H
<i>Salix cinerea</i> L.	1					Sp	N
<i>Salvia splendens</i> Seelo			1 cul			ErW	H
<i>Sanguisorba officinalis</i> L.				1 cul		Sp	H

Taxa	Frequency scale					GHg	LF
	Cz	K	O	Ś	W		
<i>Saponaria officinalis</i> L.			1 cul	1 cul		Ap	G
<i>Sarothamnus scoparius</i> (L.) W.D.L. Koch				1 cul		Kn	Ch
<i>Saxifraga granulata</i> L.			1			Sp	G
<i>Schoenoplectus tabernemontanii</i> (C.C. Gmel.) Palla					1	Sp	Hel
<i>Scilla sibirica</i> Haw.			1 cul			ErG	G
<i>Scirpus sylvaticus</i> L.			1		1	Sp	H
<i>Scrophularia nodosa</i> L.	1		1		1	Ap	H
<i>Scutellaria galericulata</i> L.					1	Sp	Hel
<i>Sedum maximum</i> (L.) Hoffm.			1	1		Ap	G
<i>Sedum reflexum</i> L.				1 cul		Sp	H
<i>Sedum sexangulare</i> L.			1			Sp	H
<i>Sedum spectabile</i> L. s.l.			1 cul			ErW	H
<i>Sedum spurium</i> M. Bieb.				1 cul		ErW	H
<i>Senecio jacobaea</i> L.			1		r	Ap	H
<i>Senecio vernalis</i> Waldst. & Kit			1		r	Kn	T1
<i>Senecio vulgaris</i> L.	1		1		1	Ar	T1
<i>Setaria viridis</i> (L.) P. Beauv.	1		1		1	Ar	T1
<i>Silene vulgaris</i> (Moench) Garcke					r	Ap	H
<i>Sisymbrium loeselii</i> L.					1	Kn	T1
<i>Sisymbrium officinale</i> (L.) Scop.		1			1	Ar	T1
<i>Solanum dulcamara</i> L.	1				1	Ap	Ch
<i>Solidago canadensis</i> L.			1		1	Kn	G
<i>Sonchus arvensis</i> L.	1				1	Ap	G
<i>Sonchus oleraceus</i> L.	1		1		1	Ar	T1
<i>Sparganium erectum</i> L.	1					Sp	Hel
<i>Spergula arvensis</i> L.			1			Ar	T1
<i>Spergula morisonii</i> Boreau			1			Ap	T2
<i>Spirodela polyrhiza</i> (L.) Schleid	1					Ap	Hyd
<i>Stachys byzantina</i> K. Koch			1 cul			ErW	H
<i>Stachys palustris</i> L.	1					Ap	G
<i>Stachys sylvatica</i> L.	1				1	Sp	H
<i>Stellaria graminea</i> L.	1		1		1	Ap	H
<i>Stellaria holostea</i> L.	2 cul			1 cul	1 cul	Sp	H
<i>Stellaria media</i> (L.) Vill.	2	1	1	1	1	Ap	T1
<i>Stellaria neglecta</i> Weihe	1			1	1	Sp	H
<i>Stellaria pallida</i> (Dumort.) Pirè	1	1	1	1		Ap	T2
<i>Stellaria palustris</i> Retz.			1		1	Sp	H
<i>Symphytum officinale</i> L.				1	1	Ap	H
<i>Tanacetum vulgare</i> L.			1		1	Ap	H
<i>Taraxacum officinale</i> Web.	1	1	1	1	1	Ap	H
<i>Telekia speciosa</i> (Schreb.) Baumg.				1 cul		ErW	H
<i>Thlaspi arvense</i> L.					r	Ar	T1
<i>Tilia cordata</i> Mill.	1					Ap	M
<i>Torilis japonica</i> (Houtt.) DC.	1		1			Ap	T2
<i>Tragopogon dubius</i> Scop.					r	Ap	T2
<i>Tragopogon pratensis</i> L. s.s.	1		1			Ap	T2
<i>Trifolium arvense</i> L.			1			Ap	T1



Taxa	Frequency scale					GHg	LF
	Cz	K	O	Ś	W		
<i>Trifolium campestre</i> Schreb.			1			Ap	T1
<i>Trifolium dubium</i> Sibth.					1	Ap	T1
<i>Trifolium hybridum</i> L.					1	Ap	H
<i>Trifolium pratense</i> L.	2		1		1	Ap	H
<i>Trifolium repens</i> L.	1		1		1	Ap	H
<i>Tulipa gesneriana</i> L.				r cul		ErW	G
<i>Tussilago farfara</i> L.	1				1	Ap	G
<i>Typha angustifolia</i> L.	2		1			Sp	Hel
<i>Typha latifolia</i> L.	1				1	Ap	Hel
<i>Urtica dioica</i> L.	1	1	1		1	Ap	H
<i>Urtica urens</i> L.				1		Ar	T1
<i>Valerianella locusta</i> Laterr. emend. Betcke			1			Ar	T1
<i>Verbascum lychnitis</i> L.			1		r	Ap	T2
<i>Verbascum nigrum</i> L.					r	Ap	T2
<i>Verbascum phlomoides</i> L.	1			1		Ap	T2
<i>Veronica arvensis</i> L.	1	1	1			Ar	T1
<i>Veronica beccabunga</i> L.			1		1	Sp	H
<i>Veronica chamaedrys</i> L. s.s.	1	1	1	1	1	Ap	H
<i>Veronica hederifolia</i> L. s.s.	1	1			r	Ap	T1
<i>Veronica officinalis</i> L.			1		1	Ap	H
<i>Veronica opaca</i> Fr.	1					Ar	T1
<i>Veronica polita</i> Fr.	1				r	Ar	T1
<i>Veronica serpyllifolia</i> L.					r	Ap	H
<i>Veronica spicata</i> L.			1			Ap	H
<i>Veronica sublobata</i> M.A. Fisch.	1	2	1	1	1	Ap	T1
<i>Veronica triphyllos</i> L.				1		Ar	T1
<i>Vicia angustifolia</i> L.	1		1			Ar	T1
<i>Vicia cracca</i> L.	1		1		1	Ap	G
<i>Vicia dasycarpa</i> Ten.	1					Kn	T1
<i>Vicia hirsuta</i> (L.) Gray.			1		1	Ar	T1
<i>Vicia sepium</i> L.	1		1		1	Ap	G
<i>Vicia tetrasperma</i> (L.) Schreb.					1	Ar	T1
<i>Vicia villosa</i> Roth	1					Ar	T1
<i>Vinca minor</i> L.		1 cul	1 cul	1 cul	1 cul	ErW	Ch
<i>Viola arvensis</i> Murray			1			Ar	T1
<i>Viola cyanea</i> Čelak.			1 cul			Kn	H
<i>Viola odorata</i> L.	1 cul	2 cul	2 cul	1 cul	1 cul	Kn	H
<i>Viola reichenbachiana</i> Jord. ex Boreau	2		1	1	1	Sp	H
<i>Viola riviniana</i> Rchb.	1		1		1	Sp	H
<i>Yucca filamentosa</i> L.			1 cul			ErW	H

## Explanations:

Cz – Czarniejewo, K – Konarzewo, O – Obrzycko, Ś – Śmiełów, W – Wąsowo; cul – species introduced to cultivation.

Frequency classes: 1 – very rare; 2 – rare; 3 – moderately frequent, rare; 4 – frequent; 5 – very frequent (common).

LF (life forms): M – megaphanerophyte; N – nanophanerophyte; Ch – chamaephyte; G – geophyte; H – hemicryptophyte; Hel – helophyte; Hyd – hydrophyte; T0 – annual plant not producing seeds; T1 – annual plant; T2 – biennial plant; Li – liana.

GHg (geographical-historical groups): Sp – spontaneophyte; Ap – apophyte; Ar – archeophyte; Kn – kenophyte; ErW – ergasiophyte spreading vegetatively; ErgG – ergasiophyte spreading generatively; Er0 – ergasiophyte not wintering; Ef – ephemerophyte.

Table 3. Number of species in analysed palace parks

Palace park	All species	Species in the particular layer			Cultivated species
		trees	shrubs	herbaceous	
Czerniejewo	268	46	51	189	83
Konarzewo	133	25	33	79	66
Obrzycko	327	37	54	250	125
Śmiełów	183	30	49	114	109
Wąsowo	335	36	39	263	81

Table 4. Number of species in individual frequency classes. For species found in several classes the highest frequency class is given

	Czerniejewo	Konarzewo	Obrzycko	Śmiełów	Wąsowo
1	138	77	209	173	317
2	108	47	97	10	14
3	21	9	21	0	2
4	0	0	0	0	2
5	1	0	0	0	0
Total	268	133	327	183	335

For abbreviations see Table 2.

teen of the reported species are invasive species on the national scale (*Acer negundo*, *Amaranthus retroflexus*, *Bidens frondosa*, *Bromus carinatus*, *Conyza canadensis*, *Echinochloa crus-galli*, *Echinocystis lobata*, *Erigeron annuus*, *Galinsoga ciliata*, *G. parviflora*, *Impatiens parviflora*, *Oxalis fontana*, *Prunus serotina*, *Quercus rubra*, *Robinia pseudoacacia*, *Setaria viridis*, *Solidago canadensis*). Seven species are invasive on the regional scale: *Ailanthus altissima*, *Amelanchier spicata*, *Clematis vitalba*, *Epilobium ciliatum*, *Juglans regia*, *Lolium multiflorum*, *Lycium barbarum*. Five of the recorded alien established species are

recessing species – *Aethusa cynapium*, *Anthriscus cerefolium*, *Gagea arvensis*, *Veronica opaca*, *Veronica polita*.

Cultivated plants included also species covered by strict species protection (*Iris sibirica*, *Primula vulgaris*) and species covered by partial protection (*Allium ursinum*, *Aruncus sylvestris*, *Epipactis helleborine*, *Galanthus nivalis* and *Taxus baccata*). Protected species were found in all the analysed park plantings. The greatest numbers of protected species were reported in the park in Obrzycko (6), while the number was smallest in Konarzewo (1).

Table 5. Number of species representing individual life forms of plants

LF	Czerniejewo	Konarzewo	Obrzycko	Śmiełów	Wąsowo	Together
M	56	33	49	39	46	90
N	29	20	27	26	24	68
C	0	0	1	1	0	2
Ch	4	2	9	7	8	15
G	23	16	32	18	35	63
Hel	8	0	4	2	9	13
Hyd	4	0	2	0	2	6
H	90	39	136	65	147	241
T0	0	0	2	0	0	2
T1	38	15	47	12	49	78
T2	15	6	17	11	14	32
Li	1	2	1	2	1	2
Total	268	133	327	183	335	612

For abbreviations see Table 2.

Table 6. Number of species representing individual geographical-historical groups

GHg	Czerniejewo	Konarzewo	Obrzycko	Śmiełów	Wąsowo	Together
Sp	35	10	45	30	75	109
Ap	145	62	160	68	166	248
Ar	22	12	23	7	22	46
Kn	24	16	29	24	35	56
Kn×Ap	1	0	0	0	1	2
Ef	0	0	0	0	1	1
ErW	39	29	59	43	33	127
ErG	1	2	8	8	1	15
ErO	0	0	2	0	0	2
Cultivated forms	1	2	1	3	1	6
Total	268	133	327	183	335	612

For abbreviations see Table 2.

The following indices of synanthropization were obtained for the flora in the investigated parks:  $WS_c = 82.01\%$ ,  $WS_t = 81.86\%$ ,  $WAP_c = 40.92\%$ ,  $WAP_t = 41.26\%$ ,  $WAN_c = 41.09\%$ ,  $WAN_t = 53.16\%$ ,  $WAR_c = 7.59\%$ ,  $WAR_t = 7.65\%$ ,  $WKn_c = 9.24\%$ ,  $WKn_t = 9.32\%$ ,  $WM = 22.95\%$ ,  $WF = 0.16\%$ ,  $Wap = 69.47\%$ . Palace parks, created by man and subjected to human intervention, are characterised by high indices of synanthropization of the flora ( $WS_c$  and  $WS_t$ ). These objects, particularly intensively managed two centuries earlier, have retained a relatively high percentage of old introduced species ( $WAR_c = 7.59\%$ ), while the share of transitionally established anthropophytes is relatively small ( $WF = 0.16\%$ ).

## DISCUSSION

The analysed park and palace complexes serve a significant role as refuges of native species. Almost 60% species recorded in the five parks are apophytes and spontaneophytes. Among native plants found in these palace parks forest plants are represented in large numbers, e.g. *Aegopodium podagraria*, *Ajuga reptans*, *Allium ursinum*, *Anemone nemorosa*, *Anemone ranunculoides*, *Aquilegia vulgaris*, *Betonica officinalis*, *Campanula trachelium*, *Chaerophyllum aromaticum*, *Convallaria majalis*, *Corydalis cava*, *C. intermedia*, *Corylus avellana*, *Fragaria moschata*, *Gagea lutea*, *G. minima*, *Galanthus nivalis*, *Galeobdolon luteum*, *Galium odoratum*, *Hedera helix*, *Hepatica nobilis*, *Isopyrum thalictroides*, *Lamium maculatum*, *Luzula luzuloides*, *Lysimachia nummularia*, *Matteucia struthiopteris*, *Melica uniflora*, *Poa chaixii*, *Polygonatum multiflorum*, *Ranunculus lanuginosus*, *Taxus baccata*. Some of the recorded forest species probably come from fragments of forests, on the basis of which the parks were established. Another very important group of forest plant species comprises those, which were probably purposefully transferred from natural localities in order to enhance the value of these parks. In the past it was a common practice to transfer showy plants from their natural locality to parks (LATOWSKI & ZIELIŃSKI 2001). Sometimes showy specimens from non-forest communities were also transferred to parks. In the investigated parks this group of plants is formed by *Aruncus sylvestris*, *Berberis vulgaris*, *Campanula rapunculoides*, *Gagea pratensis*, *Geranium sanguineum*, *Gypsophilla paniculata*, *Iris sibirica*, *Juniperus communis*, *Myosotis sparsiflora*, *Myosotis sylvatica*, *Origanum vulgare*, *Petasites hybridus*, *Pinus mugo*, *Rosa gallica*, *Sanguisorba officinalis*, *Viburnum opulus*. Floristic studies of former manor parks indicate that natural habitats, from which the plants were collected, were not always situated in the close vicinity of the parks. Occasionally the species were transferred from distant regions of Poland. Native species in Poland, but not found spontaneously in the Wielkopolska region, recorded in the analysed parks definitely include *Euphorbia amygdaloides*, *Galanthus nivalis*,

*Gypsophilla paniculata*, *Lithospermum purpureocaeruleum*, *Luzula luzuloides*, *Matteucia struthiopteris*, *Myosotis sylvatica*, *Petasites hybridus*, *Pinus mugo*, *Poa chaixii*, *Taxus baccata*. According to LATOWSKI & ZIELIŃSKI (2001), establishment of new anthropogenic localities for native plants resulted in the transformation of their ranges and frequently plants growing in an apparently natural locality may constitute a genetically alien element in a given area. In turn, SZWED et al. (2008) were of an opinion that the role of parks as refuges of native plants is eliminated in a situation when genotypes of local species are modified as a result of the introduction of genetically alien plants.

Parks, as open systems, may be locations for the establishment of species originating from neighbouring ecosystems. The species escaping from vegetable gardens and established in the parks include the following plants with culinary value: *Allium scorodoprasum*, *Anthriscus cerefolium* and *Chaerophyllum aromaticum*. Among interesting kenophytes we need to mention *Geranium pyrenaicum*, *Viola cyanea* and *V. odorata*.

In the investigated parks we may definitely observe a considerable share of hemicryptophytes. The dominance of this life form of plants over the others is typical of Poland (JACKOWIAK 2001). A large share of hemicryptophytes results from the landscape character of the parks, in which habitats exhibit considerable stability and localities resemble natural plant communities. Among geophytes native, typically forest species, are represented in large numbers, as plants which flower before full foliage appears on trees. The occurrence of geophytes flowering in early spring in the opinion of RATYŃSKA et al. (2008) is a typical characteristic of former manor parks, since they were usually purposefully introduced by man.

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