



VASCULAR FLORA AND VEGETATION OF THE FORMER MANOR PARK  
IN RADOJEWO (WIELKOPOLSKA REGION, POLAND)

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(Received: December 18, 2008. Accepted: January 9, 2009)

**ABSTRACT.** The paper presents the current composition of vascular flora and vegetation in the former manor park in Radojewo. It was decided to focus on species introduced to cultivation in the past and still found today – a total of 38 species. The most interesting example is *Eranthis hyemalis*, which in places is observed to form carpets over large areas of the park. Four plant communities classified as strongly threatened (V) and three at a slight risk (I) for the Wielkopolska region were found in the former manor park.

**KEY WORDS:** Wielkopolska, Radojewo, former manor park, vascular flora, plant communities

INTRODUCTION

Radojewo is a village located approx. 9 km north of the centre of the city of Poznań and 2 km from the Warta river bed. A historic manor house with a vast park is found there. The manor house in the late classical style was built at the same time when the park was established, i.e. the 1820's. Both objects belonged to the von Treskow family. The palace was designed by architects associated with and possibly even with the cooperation of Karl Frederich Schinkel, while the park was designed by Peter Joseph Lenné, a creator of the royal gardens in Postdam.

The park is approx. 21 ha in area and represents the landscape (Romantic) style. It is characterised by a free arrangement and irregular shape, as well as varied topographic features, with some man-made elevations. In the past there were artificial ruins, an alpine garden, scenic points with boulders, bowers and other structures, decorative ponds and a small family cemetery of the German family of von Treskow – former owners of the estate. Only some of the old elements of the park design remain today: ruins, the cemetery, ponds (drained at present) as well as former path patterns.

The palace is located in the western part of the park. At the front entrance to the palace there is a round courtyard, planted with trimmed lime trees. Thus the palace was linked through a view axis with the palace and a monastery in Owińska on the other bank of the Warta River.

It has been attempted for several years now to cover the park with legal protection as the Kokoryczowe Wzgórze [The Corydalis Hill] partial reserve. In spring carpets of *Corydalis cava* bloom here (JANYSZEK et AL. 1999). The biggest attraction of the park is winter aconite *Eranthis hyemalis*, blooming at the turn of February

and March. This plant forms small tubers, from which 5-10 cm tall shoots grow above the ground. At the tip of each shoot there is a whorl of leaves meeting at the base and composed of linear leaflets with equal narrow notches. Immediately above the leaves there are single, large, golden yellow flowers.

Almost the entire area of woods in the Radojewo park represents the so-called slopetype riparian forest (*Viola odoratae-Ulmetum*). In terms of its flora composition it is one of the richest forest communities in Poland (JANYSZEK and SZCZEPANIK-JANYSZEK 2002).

The historic park in Radojewo is a unique object not only in terms of its historical heritage, but also in terms of its natural and scenic value (JANYSZEK et AL. 1999).

At present the park has run wild to a high degree, it is classified as a forest park and is administered by the Regional Directorate of State Forests in Poznań.

MATERIAL AND METHODS

Field mapping of herbaceous as well as tree and shrub species consisted in listing species recorded in the field studies and determining their frequency in a 5-point scale. The list of legally protected taxa was taken from the Ordinance of the Minister of the Environment of 2004 on wild protected plant species.

In order to determine the frequency of species a 5-point scale was applied: 1 – very rare species (covering < 5% park area), 2 – rare species (5-25%), 3 – relatively frequent species (25-50%), 4 – frequent species (50-75%), and 5 – common species (75-100%). Groups in terms of their geographical-historical status and socio-ecological groups are presented according to CHMIEL (1993), with slight modifications, while Raunkiaer's life forms are given according to ZARZYCKI et AL. (2002).

Nomenclature of species was adopted after MIREK et AL. (2002). Plant communities in the park were identified on site, using diagnoses given in a study by BRZEG and WOJTERSKA (2001). Data concerning the degree of threat to individual phytocenes in the Wielkopolska region were also adopted following that study.

## RESULTS OF VASCULAR FLORA AND VEGETATION SURVEY

A total of 165 species of vascular plants were recorded in the former manor park at Radojewo (Table 1).

TABLE 1. A list of vascular plant species recorded in the former manor park in Radojewo

Taxon	Frequency classes	GGH	GFŻ	GSE
Tree layer				
<i>Acer platanoides</i> L.	2	Ap	M	1
<i>Acer pseudoplatanus</i> L.	1	Ap	M	1
<i>Aesculus hippocastanum</i> L.	1	D	M	19
<i>Fagus sylvatica</i> L.	1	Sp	M	1
<i>Fraxinus excelsior</i> L.	3	Ap	M	1
<i>Larix decidua</i> Mill.	1	D	M	2
<i>Malus sylvestris</i> Mill.	1	Ap	M	1
<i>Platanus xhispanica</i> Mill. ex Münchh.	1	D	M	19
<i>Quercus petraea</i> (Matt.) Liebl.	1	Ap	M	1
<i>Quercus robur</i> L.	1	Sp	M	1
<i>Pinus sylvestris</i> L.	1	Ap	M	5
<i>Robinia pseudoacacia</i> L.	2	Ken	M	14
<i>Tilia cordata</i> Mill.	1	Ap	M	1
<i>Tilia platyphyllos</i> Scop.	4	Ap	M	1
<i>Ulmus glabra</i> Huds.	3	Ap	M	1
<i>Ulmus minor</i> Mill. emend. Richens	3	Ap	M	1
Shrubby layer				
<i>Acer platanoides</i> L.	1	Ap	M	1
<i>Acer pseudoplatanus</i> L.	1	Ap	M	1
<i>Berberis vulgaris</i> L.	1	Ap	N	4
<i>Corylus avellana</i> L.	1	Sp	N	1
<i>Crataegus laevigata</i> (Poir.) DC.	1	Ap	N	1
<i>Crataegus monogyna</i> Jacq.	1	Ap	N	2
<i>Euonymus europaea</i> L.	2	Ap	N	1
<i>Forsythia xintermedia</i> Zabel	1	D	N	19
<i>Ligustrum vulgare</i> L.	1	Ken	N	19
<i>Lonicera xylosteum</i> L.	3	Sp	N	1
<i>Lycium halimifolium</i> Mill.	1	Ken	N	14
<i>Padus serotina</i> (Ehrh.) Borkh.	1	Ken	M	19
<i>Parthenocissus quinquefolia</i> (L.) Planch. in A. & C. DC.	1	D	N	19
<i>Philadelphus coronarius</i> L.	2	D	N	19

TABLE 1 – cont.

1	2	3	4	5
<i>Prunus cerasifera</i> Ehrh.	1	Ken	M	19
<i>Prunus spinosa</i> L.	2	Sp	N	1
<i>Ribes alpinum</i> L.	3	Ken	N	19
<i>Ribes spicatum</i> E. Robson	1	Sp	N	1
<i>Ribes uva-crispa</i> L.	2	Sp	N	2
<i>Rosa canina</i> L.	1	Ap	N	4
<i>Rubus caesius</i> L.	1	Ap	Ch	13
<i>Sambucus nigra</i> L.	1	Ap	N	3
<i>Staphylea pinnata</i> L.	1	D	N	19
<i>Symphoricarpos albus</i> (L.) S.F. Blake	2	Ken	N	19
<i>Syringa vulgaris</i> L.	2	Ken	N	19
<i>Ulmus glabra</i> Huds.	2	Ap	M	1
<i>Ulmus minor</i> Mill. emend. Richens	1	Ap	M	1
<i>Viburnum lantana</i> L.	1	D	N	19
<i>Viscum album</i> L.	1	Ap	Ch	1
<i>Vitis vinifera</i> L.	1	D	N	19
Herb layer				
<i>Adoxa moschatellina</i> L.	3	Sp	G	1
<i>Aegopodium podagaria</i> L.	3	Sp	H	1
<i>Agrimonia eupatoria</i> L.	1	Ap	H	4
<i>Alliaria petiolata</i> (M. Bieb.) Cavara & Grande	2	Ap	T	3
<i>Allium scorodoprasum</i> L.	3	Ap	G	3
<i>Allium vineale</i> L.	1	Ap	G	4
<i>Anemone nemorosa</i> L.	1	Sp	G	1
<i>Anemone ranunculoides</i> L.	1	Sp	G	1
<i>Anthriscus cerefolium</i> (L.) Hoffm.	1	Ken	T	3
<i>Anthriscus sylvestris</i> (L.) Hoffm	2	Ap	H	3
<i>Arctium tomentosum</i> Mill.	1	Ap	H	12
<i>Arrhenatherum elatius</i> (L.) P. Beauv. ex J. Presl & C. Presl	1	Ap	H	9
<i>Artemisia vulgaris</i> L.	1	Ap	H	13
<i>Asarum europaeum</i> L.	2	Sp	H	1
<i>Avenula pubescens</i> (Huds.) Dumort.	1	Ap	H	9
<i>Ballota nigra</i> L.	1	Arch	H	14
<i>Bergenia cordifolia</i> (Haw.) Sternb.	1	D	H	19
<i>Brachypodium sylvaticum</i> (Huds.) P. Beauv.	2	Sp	H	1
<i>Bromus benekenii</i> (Lange) Trimen	1	Sp	H	2
<i>Bromus hordeaceus</i> L.	1	Ap	T	14
<i>Bromus sterilis</i> L.	1	Arch	T	3

TABLE 1 – cont.

1	2	3	4	5
<i>Bromus tectorum</i> L.	1	Arch	T	15
<i>Campanula latifolia</i> L.	2	Ap	H	1
<i>Campanula patula</i> L.	1	Ap	H	9
<i>Campanula rapunculoides</i> L.	1	Ap	H	1
<i>Campanula trachelium</i> L.	1	Sp	H	1
<i>Capsella bursa-pastoris</i> (L.) Medik.	1	Arch	T	16
<i>Cardamine amara</i> L.	1	Sp	H	7
<i>Carex spicata</i> Huds.	1	Ap	H	2
<i>Carex sylvatica</i> Huds.	1	Sp	H	1
<i>Carpinus betulus</i> L.	1	Sp	M	1
<i>Cerastium semidecandrum</i> L.	1	Ap	T	5
<i>Chaerophyllum aromaticum</i> L.	3	Sp	H	3
<i>Chaerophyllum temulum</i> L.	1	Ap	T	3
<i>Chelidonium majus</i> L.	2	Ap	H	3
<i>Cirsium arvense</i> (L.) Scop.	1	Ap	G	13
<i>Convallaria majalis</i> L.	3	Sp	G	2
<i>Convolvulus arvensis</i> L.	1	Arch	H	13
<i>Conyza canadensis</i> (L.) Cronquist	1	Ken	T	15
<i>Cornus sanguinea</i> L.	1	Sp	N	1
<i>Corydalis cava</i> Schweigg. & Körte	3	Sp	G	1
<i>Corydalis intermedia</i> (L.) Mérat	1	Sp	G	1
<i>Crataegus pedicellata</i> Sarg.	1	D	M	19
<i>Crocus chrysanthus</i> (Herb) Herb.	1	D	G	19
<i>Crocus vernus</i> (L.) Hill	1	D	G	19
<i>Dactylis polygama</i> Horv.	2	Sp	H	1
<i>Dryopteris carthusiana</i> (Vill.) H.P. Fuchs	1	Sp	H	2
<i>Dryopteris filix-mas</i> (L.) Schott	1	Sp	H	2
<i>Elymus caninus</i> (L.) L.	2	Sp	G	1
<i>Elymus repens</i> (L.) Gould	1	Ap	G	10
<i>Equisetum fluviatile</i> L.	2	Sp	Hel	7
<i>Eranthis hyemalis</i> (L.) Salisb.	4	D	G	19
<i>Festuca gigantea</i> (L.) Vill.	2	Sp	H	1
<i>Ficaria verna</i> Huds.	3	Sp	G	1
<i>Fragaria moschata</i> Duchesne	1	Ap	H	2
<i>Fraxinus excelsior</i> L.	1	Ap	M	1
<i>Gagea arvensis</i> (Pers.) Dumort.	1	Arch	G	3
<i>Gagea lutea</i> (L.) Ker-Gawler	3	Sp	G	1
<i>Galeobdolon luteum</i> Huds.	3	Sp	C	1
<i>Galium aparine</i> L.	2	Ap	T	3
<i>Galium odoratum</i> (L.) Scop.	2	Sp	H	1

TABLE 1 – cont.

1	2	3	4	5
<i>Galium mollugo</i> L.	1	Ap	H	9
<i>Galium sylvaticum</i> L.	1	Sp	H	1
<i>Geranium pusillum</i> Burm. F. ex L.	1	Arch	T	16
<i>Geranium robertianum</i> L.	2	Ap	T	3
<i>Geum urbanum</i> L.	1	Ap	H	3
<i>Hedera helix</i> L.	3	Ap	Ch	1
<i>Hemerocallis</i> sp.	2	Ken	H	19
<i>Hepatica nobilis</i> Schreb.	1	Sp	H	1
<i>Hesperis matronalis</i> L.	1	D	H	19
<i>Holcus lanatus</i> L.	1	Ap	H	8
<i>Hypericum perforatum</i> L.	1	Ap	H	2
<i>Impatiens parviflora</i> DC.	5	Ken	T	3
<i>Knautia arvensis</i> (L.) J.M. Coult.	1	Ap	H	2
<i>Lamium album</i> L.	1	Arch	H	3
<i>Lamium purpureum</i> L.	1	Arch	T	16
<i>Lapsana communis</i> L.	1	Ap	T	3
<i>Lathyrus niger</i> (L.) Bernh.	1	Sp	G	2
<i>Leonurus cardiaca</i> L.	1	Arch	H	14
<i>Lolium perenne</i> L.	1	Ap	H	10
<i>Lupinus polyphyllus</i> Lindl.	1	Ken	H	19
<i>Lysimachia nummularia</i> L.	1	Sp	H	1
<i>Melampyrum nemorosum</i> L.	1	Sp	T	2
<i>Melica nutans</i> L.	2	Sp	H	2
<i>Milium effusum</i> L.	2	Sp	H	1
<i>Moehringia trinervia</i> (L.) Clairv.	1	Sp	H	2
<i>Myosoton aquaticum</i> (L.) Moench	1	Ap	H	7
<i>Ornithogalum nutans</i> L.	2	D	G	19
<i>Ornithogalum umbellatum</i> L.	1	Ken	G	19
<i>Papaver rhoeas</i> L.	1	Arch	T	16
<i>Petasites hybridus</i> (L.) P. Gaertn.	2	Ap	G	8
<i>Pimpinella major</i> (L.) Huds.	1	Sp	H	8
<i>Poa annua</i> L.	1	Ap	T	10
<i>Poa nemoralis</i> L.	3	Sp	H	2
<i>Poa pratensis</i> L.	1	Ap	H	9
<i>Polypodium vulgare</i> L.	1	Sp	H	2
<i>Pulmonaria obscura</i> Dumort.	2	Sp	H	1
<i>Ranunculus acris</i> L.	1	Ap	H	9
<i>Ranunculus auricomus</i> L.	1	Sp	H	1
<i>Ranunculus lanuginosus</i> L.	1	Sp	H	1

TABLE 1 – cont.

1	2	3	4	5
<i>Ranunculus sceleratus</i> L.	1	Ap	T	12
<i>Rosa rubiginosa</i> L.	1	Ap	N	4
<i>Rumex acetosa</i> L.	1	Ap	H	9
<i>Scilla sibirica</i> Haw.	1	D	G	19
<i>Scirpus sylvaticus</i> L.	1	Sp	H	8
<i>Scrophularia nodosa</i> L.	1	Sp	H	1
<i>Senecio jacobaea</i> L.	1	Ap	H	4
<i>Stachys sylvatica</i> L.	2	Sp	H	1
<i>Stellaria media</i> (L.) Vill.	2	Ap	T	16
<i>Stellaria pallida</i> (Dumort.) Piré	1	Ap	T	15
<i>Taraxacum officinale</i> Web.	1	Ap	H	9
<i>Tulipa fosterana</i> W. Irving	1	D	G	19
<i>Urtica dioica</i> L.	2	Ap	H	3
<i>Veronica arvensis</i> L.	1	Ap	T	17
<i>Veronica chamaedrys</i> L.	1	Ap	H	9
<i>Veronica polita</i> Fr.	1	Arch	T	16
<i>Veronica sublobata</i> M.A. Fisch.	4	Ap	T	3
<i>Vinca minor</i> L.	3	D	Ch	19
<i>Viola canina</i> L.	1	Ap	H	2
<i>Viola hirta</i> L.	2	Sp	H	4
<i>Viola mirabilis</i> L.	3	Sp	H	1
<i>Viola odorata</i> L.	4	Ken	H	3
<i>Viola reichenbachiana</i> Jord. ex Boreau	1	Sp	H	1
<i>Viola riviniana</i> Reichenb.	2	Sp	H	2

Frequency classes: 1 – very rare (covering < 5% area of the cemetery), 2 – rare (5-25%), 3 – moderately frequent (25-50%), 4 – frequent (50-75%), 5 – very frequent (75-100%), cul – only in cultivation.

GGH (geographic-historical status): Ap – apophytes, Arch – archaeophytes, Dia – diaphytes, Ken – kenophytes, Sp – spontaneophytes.

GFŽ (life forms): C – non-woody chamaephytes, Ch – woody chamaephytes, G – geophytes, H – hemicryptophytes, Hel – helophytes, M – megaphanerophytes, N – nanophanerophytes, T – therophytes.

GSE (socio-ecological groups): 1 – fertile broad-leaved forests and shrub communities (*Fagetalia*, *Prunetalia*), 2 – acidophilous or xerothermic oak forests, mixed coniferous forests and their substitute shrub, herb or grassland communities (*Quercion robur-petraeae*, *Quercion petraeae*, *Epilobion*, *Nardetalia*), 3 – nitrophilous shrub or herb communities (*Sambuco-Salicion*, *Alliarion*), 4 – xerothermic herb or grassland communities (*Trifolio-Geranieta*, *Festuco-Brometea*), 5 – pine forests or sandy grassland (*Dicrano-Pinion*, *Sedo-Scleranthetea*, *Corynephoretea*), 6 – swamp alder forests, woodless fens, bogs and intermediate mires (*Alnion*, *Magnocaricion*, *Caricetalia fuscae*, *Sphagnion fuscii*), 7 – riparian forests and thickets, reeds and aquatic vegetation (*Salicion*, *Phragmition*, *Glycerio-Sparganion*, *Potamogetonetea*, *Lemnetea*, *Utricularietea*), 8 – humid meadows and tall herb communities (*Molinietalia*), 9 – fresh and moderately humid meadows (*Arrhenatheretalia*), 10 – nitrophilous floodplains and treaded communities (*Plantaginetea*), 11 – salt marshes and halophilous grasslands (*Thero-Salicornietea*, *Asteretea trifolium*), 12 – therophyte communities on wet and humid sites (*Bidentetea*, *Nanocyperion*), 13 – mesophilous communities of tall perennials (*Arction*), 14 – xerothermic, perennial ruderal communities (*Onopordon*), 15 – short-term, pioneer ruderal communities (*Sisymbion*, *Eragrostion*), 16 – weed communities of gardens and root crop fields (*Polygono-Chenopodietalia*), 17 – weed communities of cereal fields (*Aperetalia*), 18 – epilithic communities (*Asplenietea*), 19 – species of unknown phytosociological affiliation.

When analysing the frequency of species it needs to be stated that the most numerous group are very rare species (111 taxa), which account for over 67% total flora. In contrast, the least numerous category comprised

very frequent and frequent species, which are jointly represented by six species: *Eranthis hyemalis*, *Impatiens parviflora*, *Tilia platyphyllos*, *Ulmus glabra*, *Veronica sublobata* and *Viola odorata* (Table 2).

In terms of the geographic-historical classification the most numerous group is composed of native species: apophytes and spontaneophytes, represented jointly by 119 species, which account for over 72% total flora. The other three groups comprise alien species, each accounting for approx. 7-11% proportion (Table 3).

TABLE 2. Proportions of species in individual frequency classes in former manor park in Radojewo

Frequency classes	Number of species	%
Very rare	111	67.27
Rare	32	19.39
Moderately frequent	16	9.70
Frequent	5	3.03
Very frequent	1	0.61
Total	165	100

TABLE 3. Proportions of geographic-historical groups in the former manor park in Radojewo

(GGH) Geographic-historical status	Number of species	%
Apophytes	65	39.39
Spontaneophytes	54	32.73
Archaeophytes	12	7.27
Kenophytes	16	9.70
Diaphytes	18	10.90
Total	165	100

Species recorded in the analysed park comprise the full spectrum of Raunkiaer's life forms. The most numerous group consists of hemicryptophytes (68 species, 42.21% total flora). Megaphanerophytes, nanophanerophytes, geophytes and therophytes each account for approx. 15% total flora. The least numerous species were woody and non-woody chamaephytes as well as helophytes (Table 4). An interesting aspect is the relatively high proportion of geophytes. These include primarily spring bulbous as well as tuber-bearing plants such as *Corydalis cava*, *C. intermedia*, *Eranthis hyemalis*, *Gagea arvensis*, *G. lutea*, *Ornithogalum nutans*, *O. umbellatum*, *Scilla sibirica*, etc.

Vegetation in the analysed object belongs to 16 syngenetic groups of plant communities (Table 5). The biggest number of species, i.e. 51 (over 30% total flora) prefer communities of fertile broadleaved forests and shrub communities. A numerous group comprises also species of unknown phytosociological affiliation (27 species), which accounts for over 16% total flora. Relatively large groups (with approx. 12% total flora each) consist of species growing in acidophilous oak forests,

xerothermic oak forests, mixed coniferous forests and substitute shrub, herb and grassland communities, as well as nitrophilous shrub and herb communities.

TABLE 4. Proportions of life forms in the former manor park in Radojewo

(GFŻ) Life forms	Number of species	%
Megaphanerophytes	20	12.12
Nanophanerophytes	24	14.54
Non-woody chamaephytes	1	0.61
Woody chamaephytes	4	2.42
Hemicryptophytes	78	42.21
Geophytes	23	13.94
Therophytes	24	14.54
Helophytes	1	0.61
Total	165	100

TABLE 5. Proportions of socio-ecological groups in the former manor park in Radojewo

(GSE) Socio-ecological groups	Number of species	%
1	51	30.90
2	19	11.51
3	19	11.55
4	7	4.24
5	2	1.21
6	0	0
7	3	1.82
8	4	2.42
9	9	5.45
10	3	1.82
11	0	0
12	2	1.21
13	4	2.42
14	5	3.03
15	3	1.82
16	6	3.64
17	1	0.61
18	0	0
19	27	16.36
Total	165	100

Legend as in Table 1.



## VEGETATION

Vegetation in the Radojewo park is composed primarily of vast, diverse phytocenoses of riparian forest communities, covering fertile slopes of moraine hills, on which the park is located (Fig. 1). In the past these forests constituted a dominant component of the park design in terms of their area; their stands were undoubtedly tended, while the forest floor vegetation and the shrub layer were enriched with planted ornamental species, which clusters have remained till the present time. Apart from riparian forests, on southern margins of the park we may find small, but well-developed fragments of oak-hornbeam forests. At the boundary between the park and the surrounding open country in several places phytocenoses are formed of ecotone communities of shrubs located between the forest and outskirts communities of herbal plants, whereas in locations where there are no such transition shrub communities, at the edge of the stand we may find luxuriant phytocenoses of outskirts communities of herbal species. Their floristic composition varies, depending on the local soil moisture

and trophic conditions. Along paths and in numerous, small stands of forest communities also outskirts communities from the dynamic circle of riparian forests are observed. Inside the park, surrounded by forest lands, there is an area of former decorative ponds (at present no longer existing), covered by a complex of nitrophilous ruderal and outskirts communities and by initial well-developed spontaneous self-sown clusters of woody forest species. Additional elements adding variety to the park landscape are clusters of ornamental trees and shrubs, i.e. common lilac and common locust, found in the central and south-western part of the area.

## SYSTEMATIC LIST OF PLANT COMMUNITIES

*Forest and shrub communities*

Class *Quercu-Fagetea* Br.-Bl. et Vlieger 1937

Order *Fagetalia sylvaticae* Pawł. in Pawł. et al. 1928

Assoc. *Alnion incanae* Pawł. in Pawł. et al. 1928  
(= *Alno-Ulmion* Br.-Bl. et Tx. 1943)

***Quercu-Ulmetum minoris* Issler 1924**

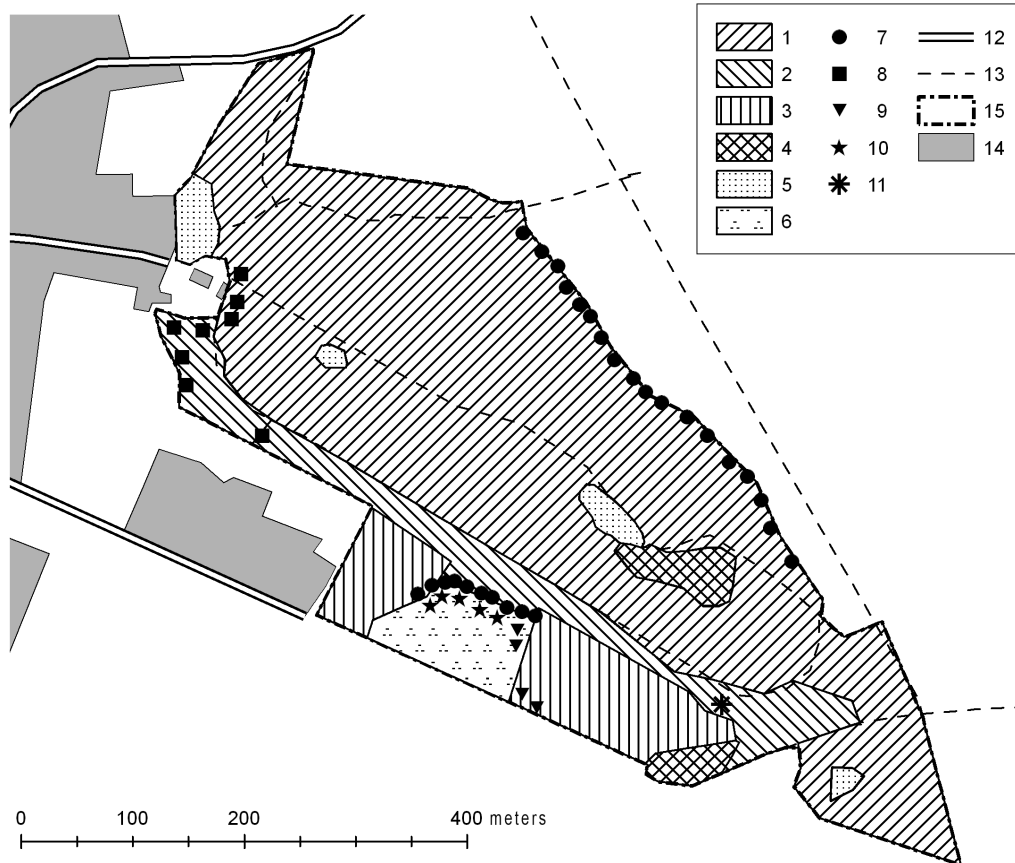


FIG. 1. Map of the plant communities of the former manor park in Radojewo  
Explanation of symbols: 1 – *Quercu-Ulmetum minoris violetosum odoratae*, 2 – *Quercu-Ulmetum minoris typicum*, 3 – *Galio sylvatici-Carpinetum*, 4 – *Chelidonio-Robiniatum*, 5 – *Syringa vulgaris* community, 6 – *Arrhenatheretum elatioris*, 7 – *Euonymo-Prunetum spinosae*, 8 – *Aegopodio-Sambucetum nigrae*, 9 – *Trifolio-Melampyretum nemorosi*, 10 – *Trifolio-Agrimonetum eupatoriae*, 11 – *Aegopodio-Petasitetum hybridi*, 12 – paved roads, 13 – forest roads and paths, 14 – buildings and gardens, 15 – boundary of the studied area. Due to the small scale of map, paths are not shown of common nitrophilous herb communities belonging to following plant associations: *Anthriscetum sylvestris*, *Chaerophylletum aromatici*, *Agropyron repens-Urtica dioica* comm., *Alliario-Chaerophylletum temuli*, *Myosotido sparsiflorae-Alliarietum petiolatae*, *Geo urbani-Chelidonetum maji*, *Impatientetum parviflorae*, *Galio aparines-Veronicetum sublobatae*, *Leonuro cardiacae-Ballotetum nigrae*, *Lycietum halimifolii*, *Convovulo arvensis-Agropyretum repentis*.



Assoc. *Carpinion betuli* Issler 1931 em. Oberd. 1957

***Galio sylvatici-Carpinetum* (R. Tx. 1937) Oberd. 1957**

Trunk communities of unknown syntaxonomic affiliation

***Chelidonio-Robinetum* Jurko 1963 s.l.  
Community with *Syringa vulgaris***

Class *Rhamno-Prunetea* Rivas-Goday et Borja Carbonell 1961 ex. R. Tx. 1962

Order *Prunetalia spinosae* R. Tx. 1952

Assoc. *Urtico-Crataegion* Pass. in Pass. et Hoffmann 1968

***Euonymo-Prunetum spinosae* (Hueck 1931) Pass. et Hoffmann 1968**

***Aegopodio-Sambucetum nigrae* Doing 1962 em. M. Wojterska 1990**

*Xerothermophilous tall herb forest edge communities*

Class *Trifolio-Geranietea sanguinei* Th. Müller 1962

Order *Origanetalia vulgaris* Th. Müller 1962

Assoc. *Geranion sanguinei* R. Tx. in Th. Müller 1962

***Trifolio-Agrimonetum eupatoriae* Th. Müller 1962**

***Trifolio-Melampyretum nemorosi* (Pass. 1967) Dierschke 1973**

*Grassland communities*

Class *Molinio-Arrhenatheretea* R. Tx. 1937 em. 1970

Order *Arrhenatheretalia* Pawł. 1928

Assoc. *Arrhenatherion elatioris* W. Koch 1926

***Arrhenatheretum elatioris* Br.-Bl. 1919 ex Scherrer 1925**

*Nitrophilous tall herb communities*

Class *Artemisietea vulgaris* Lohmeyer, Preising et R. Tx. in R. Tx. 1950

Order *Convolvuletalia sepium* R. Tx. 1950 em. Oberd. in Oberd. et al. 1967

Assoc. *Petasition officinalis* Sillinger 1933 em. R. Tx. 1967

***Aegopodio-Petasitetum hybridi* R. Tx. (1937) 1947**

***Anthriscetum sylvestris* Hadač 1978**

***Chaerophylletum aromatici* (R. Tx. 1967) Neuhäuslová-Novotná et al. 1969**

**Comm. *Agropyron repens-Urtica dioica***

Assoc. *Galio-Alliarion* (Oberd. 1962) Lohmeyer et Oberd. in Oberd. et al. 1967

***Alliario-Chaerophylletum temuli* Lohmeyer 1949**

***Myosotido sparsiflorae-Alliarietum petiolatae* Gutte 1973**

***Geo urbani-Chelidonetum maji* Jarolímek et al. 1997**

***Impatientetum parviflorae* Brzeg 1989 ex Borysiak 1994**

***Galio aparines-Veronicetum sublobatae* Brzeg in Brzeg et M. Wojterska 2001**

Assoc. *Arction lappae* R. Tx. em Sissingh in Westhoff et al. 1946

***Leonuro cardiaca-Ballotetum nigrae* Slavnić 1951**

***Lycietum halimifolii* Felföldy 1942**

Order *Agropyretalia repentis* Oberd., Th. Müll. et Görs 1967

Assoc. *Convolvulo-Agropyron repentis* Görs 1966

***Convolvulo arvensis-Agropyretum repentis* Felföldy (1942) 1943**

## DESCRIPTION OF THE DISTRIBUTION OF PLANT COMMUNITIES

### A. Forest and shrub communities

*Querc-Ulmetum minoris* – this community constitutes the dominant element in the vegetation cover of this object, covering almost the entire park hill. Several forms of the described association may be distinguished in its area.

Elm riparian forest with common violet occupies the biggest area. Such phytocenoses in the past were classified as a separate association (*Violo odoratae-Ulmetum* Doing 1962), or are treated as a separate sub-population within elm-ash riparian forests (*Ficario-Ulmetum violetosum odoratae*), or ash-alder riparian forests (*Fraxino-Alnetum violetosum odoratae*). Phytocenoses of the described community cover the ridge and slopes of the hill, being richest in terms of their floristic composition on the southern slope of the park hill, descending towards the former ponds (particularly in the surroundings and below the little cemetery).

The stand of the described phytocenoses is composed of different broadleaved tree species, both originating from natural seeding and remnants of the former park plantings. Both in the lower layer of the stand and in the shrub layer a permanent high proportion is found of common elm (*Ulmus minor*), which presence may be considered a characteristic distinguishing phytocenoses of riparian forests from oak-hornbeam forest phytocenoses. The herb layer is very rich in terms of species composition. The forest floor vegetation includes numerous geophytes and early spring therophytes, in the described phytocenoses forming especially attractive colour aspects. Among geophytes a species of special interest is especially winter aconite *Eranthis hyemalis*, blooming in the early spring, an exotic species, although probably being a remnant of old park plantings, forming here a stable, numerous population. Considerable density is also found for *Corydalis cava* and *Ficaria verna*. In the spring season the forest floor vegetation is very dense. Later with the development of tree foliage the forest floor vegetation density decreases and in the summer season it is already relatively sparse.

Another form of the elm-ash riparian forest consists of small phytocenoses representing a typical sub-population (*Q.-U. m. typicum*). The biggest of them may be found in the highest part of the valley with ponds, located in the vicinity of the palace, on a local water seepage site drained by short streams. Although the stand is deformed by plantings of park trees – common horse chestnuts and plane trees, the forest floor vegetation is well-preserved and typical of riparian forests. Other phytocenoses representing this form of the association overgrow the lowest parts of the northern and eastern slopes of the palace hill. These phytocenoses in terms of

physiognomy resemble oak-hornbeam forest; however, the characteristic determining their classification to riparian forests is primarily the permanent and considerable proportion of *Ulmus minor* in the stand and in the shrub layer.

*Galio sylvatici-Carpinetum* – a phytocenosis of several hectares of a very well-developed oak-hornbeam forest covers a slope located on the southern side of the reserve, south of the park pond valley. The stand is composed here of oak and ash, with the lower layer formed primarily by sycamore maple, although with an admixture of hornbeam and a very slight proportion of common elm. The floristically rich forest floor vegetation, with a proportion of numerous spring geophytes, in terms of species composition similar to the riparian forest floor vegetation, differs from this as a result of high proportions of such species as *Galium odoratum*, *Dactylis polygama* or *Galeobdolon luteum*, and low proportions of *Viola odorata*, *Corydalis cava* or *Gagea lutea*.

*Chelidonio-Robinetum* – a forest community, with a stand formed by common locust, with luxuriant forest floor vegetation composed of strongly nitrophilous shrub or herb, and ruderal species. In the reserve they may be found at two locations: below the man-made ruins, on the southern slope of the main park hills, and at the edge of the oak-hornbeam phytocenoses (i.e. the boundary of the analysed object), in a clay excavation pit. In case of both phytocenoses the stand is rather old, with dying and fallen trees. Thickets of young locust or common elder shrubs are formed in gaps. The forest floor vegetation is composed of nitrophilous species, primarily *Chelidonium majus*, *Alliaria petiolata* and *Impatiens parviflora*.

Community with *Syringa vulgaris* – scrubs with the predominance of common lilac, being remnants of old park plantings, overgrow areas of several hectares in four locations in the reserve: around the artificial ruins at the top of the hill, next to the main avenue mid-way between the ruins and the palace, in the vicinity of the palace gate and at the top of a separate hill – a mound, at the south-western edge of the reserve. In the shrub layer large specimens of *Syringa vulgaris* predominate, reaching considerable density. The forest floor vegetation is loose and composed mainly of shade-tolerant nitrophilous species.

#### B. Ecotone communities located between forest communities and forest edge communities

*Euonymo-Prunetum spinosae* – small phytocenoses of ecotone communities between forest and forest edge communities in the form of hawthorn scrubs may be found in a narrow belt, approx. 2 m wide, at the north-eastern boundary of the reserve. They develop in a typical situation, i.e. as ecotone communities located between forest communities and forest edge communities, between the riparian forest phytocenosis and adjacent fallow land. In the shrub layer *Prunus spinosa* predominates with an admixture of two hawthorn species – *Crataegus levigata* and *C. monogyna* as well as roses (*Rosa* sp. div.).

*Aegopodio-Sambucetum nigrae* – nitrophilous scrubs with common elder predominating may be found in the immediate surroundings of the palace. They are formed

at the edges of buildings, in relatively well-lighted, but overfertilized spots (e.g. as a consequence of long-term storage of garden wastes, etc.). Distinguishing characteristics here include the shrub layer formed by common elder, and the proportion of nitrophilous ruderal species in the forest floor vegetation, particularly perennial plants, such as *Urtica dioica*, *Ballota nigra* or *Arctium tomentosum*.

#### C. Xerothermophilous forest edge tall herb communities

Phytocenoses belonging to two associations, i.e. *Trifolio-Agrimonetum eupatoriae* and *Trifolio-Melampyretum nemorosi*, develop at the boundary of oak-hornbeam forest stands, in the southern part of the object, between the forest and a ryegrass meadow adjacent from the south, into which the described ecotone forest edge communities are gradually transformed.

#### D. Grassland communities

A fragment of a fertile meadow of the *Arrhenatheretum elatioris* type may be found in the southern part of the object, north-west of phytocenoses of oak-hornbeam forest communities. The phytocenosis, approx. 0.5 ha in area, covers a slope inclined to the north, down towards the forest border. For several years the meadow has not been used for hay, as a result of which slow symptoms of overgrowing may be observed, first of all by ecotone forest edge communities.

#### E. Nitrophilous tall herb communities

The most interesting association of tall nitrophilous herbs in the analysed area is *Aegopodio-Petasitetum hybridi* – phytocenoses of this association with the predominance of butterbur in the Wielkopolska region are very often found in former palace parks or in their surroundings. It seems that butterbur was used by 19th century landscape architects for plantings on water seepage sites and in places with high groundwater tables and thus created tall herb carpets still persisting till the present. Also in the Radojewo park such phytocenoses may be found, in the vicinity of the lowest pond, previously existing in the elongated valley in the southern part of the park. At the same time phytocenoses of this type tend to expand – in the course of the last 15 years new phytocenoses of the described association have covered the road along the south-eastern boundary of the analysed object.

Moreover, tall nitrophilous herbs in the investigated area play an important role in the landscape, filling gaps in the stand and developing on its edges. In the analysed area phytocenoses of further 11 associations of this group are found (see list on p. 45). Most of them are communities common in the Wielkopolska region; however, two associations are classified as communities threatened with extinction, although the degree of this threat is hard to determine (BRZEG and WOJTERSKA 2001). These include *Leonuro cardiaca-Ballotetum nigrae* – a strongly nitrophilous, perennial ruderal community, found in the form of several phytocenoses along the fence, at the back of the Radojewo palace, at the compost storage site; and *Lycietum halimifolii*, found in the immediate neighbourhood of the Radojewo palace,

and – in the form of small phytocenoses – in a vast complex of common lilac scrubs around the shrine, in the vicinity of the palace.

#### CONCLUDING REMARKS

The paper presents the current composition of vascular flora in the former manor park in Radojewo. Species introduced to cultivation in the past and surviving to the present need to be stressed here. They include: *Aesculus hippocastanum*, *Allium scorodoprasum*, *Anthriscus cerefolium*, *Ballota nigra*, *Berberis vulgaris*, *Campanula latifolia*, *Chaerophyllum aromaticum*, *Convallaria majalis*, *Corydalis cava*, *C. intermedia*, *Crocus chrysanthus*, *C. vernus*, *Eranthis hyemalis*, *Forsythia xintermedia*, *Hedera helix*, *Hemerocallis* sp., *Hesperis matronalis*, *Lamium album*, *Leonurus cardiaca*, *Ligustrum vulgare*, *Lonicera xylosteum*, *Lupinus polyphyllus*, *Lycium halimifolium*, *Ornithogalum nutans*, *O. umbellatum*, *Parthenocissus quinquefolia*, *Petasites hybridus*, *Philadelphus coronarius*, *Platanus xhispanica*, *Ribes alpinum*, *Staphylea pinnata*, *Symphoricarpos albus*, *Syringa vulgaris*, *Viburnum lantana*, *Vinca minor*, *Viola odorata* and *Vitis vinifera*.

The following species, planted in later times and not running wild, are found around the manor house: *Aegopodium podagraria* for. *variegata*, *Campanula medium*, *Chaenomeles speciosa*, *Elaeagnus angustifolia*, *Geranium macrorrhizum*, *Matteucia struthiopteris* and *Sedum spurium*, while *Parthenocissus quinquefolia* is climbing over the manor house wall, and *Cerastium biebersteinii* is growing next to the monument.

The population of *Eranthis hyemalis* in the Radojewo park belongs to the most numerous in Poland.

Small clusters of *Hesperis matronalis* as well as *Crocus chrysanthus* and *C. vernus* were recorded in the cemetery of the von Treskow family. *Hesperis matronalis* was frequently planted on old, mainly evangelical cemeteries in the Wielkopolska region, where it has survived till today (CZARNA 2001).

Four types of communities, considered to be threatened with extinction in the Wielkopolska region, were found among plant communities recorded in the planned Kokoryczowe Wzgórze reserve (BRZEG and WOJTERSKA 2001). Four of these communities are classified to the category of significantly threatened (V). They are: *Quercu-Ulmetum minoris*, *Galio sylvatici-Carpinetum*, *Trifolio-Melampyretum nemorosi* and *Arrhenatheretum elatioris*. It needs to be stressed that phytocenoses of the first two above mentioned associations cover almost the entire area of the analysed object and their phytocenoses are very rich floristically and perfectly preserved here.

The next three types of communities are classified to the category at a slight risk of threat (I). These include *Trifolio-Agrimonetum eupatoriae*, *Leonuro cardiaca-Ballotetum nigri* and *Lycietum halimifolii*. However, they account for a very slight proportion of the vegetation in the analysed object and are limited to small and scattered phytocenoses, in the transition zone between

forests and fields and in the surroundings of the Radojewo palace.

As an area of the relatively large, well-developed and floristically rich phytocenoses of riparian and oak-hornbeam forests, at the same time located at the outskirts of a big city and thus at a strong pressure of tourist traffic and land development, the former manor park in Radojewo deserves to be covered by reserve protection. However, this conservation needs to be maintained not only in order to preserve the existing plant communities and the rich native species flora, but also to provide stability for the populations of species originating from cultivation, particularly a characteristic, early spring element of the reserve landscape, *Eranthis hyemalis*, found here in abundance.

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For citation: Czarna A., Klimko M., Janyszek S. (2009): Vascular flora and vegetation of the former manor park in Radojewo (Wielkopolska region, Poland). Roczn. AR Pozn. 388, Bot.-Stec. 13: 37-47.