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PARK-AND-PALACE COMPLEXES AS BIODIVERSITY REFUGES ON EXAMPLE GAŁĘZÓW EX-MANOR PARK

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Summary. Village parks occupy a special place in the Polish landscape. Nowadays they represent valuable historical and cultural values. Village ex-manor parks perform educational, natural, social and landscape functions. In these areas often focuses the greatest number of monumental trees. The aim of study was to determine plants species diversity in Gałęzów ex-manor park based on dendrological and floristic inventory and dendrochronological analysis. From among twenty-four inventoried tree species within the park, the largest group represented *Acer platanoides*. The next two big groups are alley trees species: *Tilia cordata* and *Carpinus betulus*. Equally large group represented poplar trees. *Larix decidua* and *Larix polonica* deserve on particular attention. Most of larch trees should be considered as nature monuments The appearance of juvenile sown by the wind, shows that this species feels good in this habitat. Carried out dendrochronological analyzes allowed to identify six age groups trees. The most numerous age group represent trees at 41 to 70 years old, from about 1940–1970 years. Trees over 120 years are a testimony of time and history in Gałęzów. In This group includes mentioned larches and beautiful common oak growing at the court, which should be protected monument al.

Key words: ex-manor park, stand trees, plant communities, biodiversity

INTRODUCTION

Village parks occupy a special importance in Polish landscape. Established with courts give them their unique character and charm. They influence on the climate of village not only, but also offer places for recreation and relaxation. They represented village aristocratic residents, which are the most characteristic buildings in Polish cultural landscape. Parks are called as the high concentration of green, caused by artificial planting, as a result of adaptation of existing green, or remnants of ancient forests primeval. Nowadays they represent valuable historical and cultural values. Village parks perform educational, natural, social and

landscape functions. In these areas there are the greatest number of monumental trees concentration [Fabiańska 2004].

Currently, village parks have a great importance as a high green landscape oasis in an open rural landscape. Primarily they represent a huge biocenotic importance. They are forming a convenient places for the gene pool exchange between ecosystems, reducing the strength of winds, maintaining optimal humidity during periods of prolonged drought, as well as they determine natural habitat for flora and fauna occurring in these areas [Fijałkowski and Kseniak 1982].

The aim of study was to determine flora diversity species at Gałęzów ex--manor-park based on dendrological and floristic inventories and dendrochronological analysies.

STUDY AREA

Gałęzów is an extensive village in the southern part of Lublin district, situated on the Giełczewska Uplift, about 2 km away to the south of Bychawa city, near road to Kraśnik Lubelski. Gently wavy line, dominant in this place is characteristic for upland landscapes rising about 230–250 meters above sea level. The village is dissected by the Gałęzówka river valley, which is today only a stream from whose are considered gullies and dry denudation basin-shaped valleys. The river is considered to Bystrzyca river tributary – Kosarzewka at Bychawa city [Gawarecki *et al.* 1979, Dębowczyk and Pytlak 2003].

Surroundings of the park in Gałęzów is exceptionally floristically and fauna rich, which is conditioned of biotopes mosaic. The neighborhood region is devoid of large urban agglomerations, what favours to biodiversity of species. Addition, Krzczonowski Landscape Park is relatively close, and there are many forms of protected landscape [Wilgat 1992]. Efficiently system of ecological corridors such as river valleys and forests, it shows Gałęzów as reach in often rare and special ones of fauna representatives. The Gałęzów ex-manor park isn't located on the protected area by law. An area of the Park currently stands at 4.5 ha. Historical park boundaries in most extent correspond with contemporary boundaries.

METHODS

The basis of conducted research between 2008 and 2009 was a detailed dendrological inventory primer based on the geodesic plan. Recent studies of this type in this region were carried out in 2002 by the Department of Urban Greenery of LSM District in Lublin. Such documents should be updated in each two years. Because of significant changes that have occurred for six years after the previous one studies, new inventory was quite necessary with detailed maseurements. There were taken: crown diameter measurements, the breast-height

girth at height of 1.3 meters and estimated height measurements and description of health status of individual trees [Seneta and Dolatowski 2000]. For determination of trees age were dendrochronological method was used. Age of individual trees was determined on the basis of circuits and trunk diameters measurement calculated using by Majdecki method [1978]. Outlines of the crown extent (measured at its widest point) of individual trees, plotted on the map. Missing trees (about 100) were measured by method of rectangular measurement.

Dendrochronology inventory allowed to conducting a detailed tree stand research in terms of their age and species.

In the same period field works, in addition to dendrological inventory it was made ground park floristic analysis in spring and summer plant cover. To identify an existing plant communities was used method of Braun-Blanquet phytosociological survey [1951]. Within a park were made 6 surveys during spring time and 12 in summer time, including one in historic forest bordering on the east, and one on the meadow near ponds (Fig. 1).

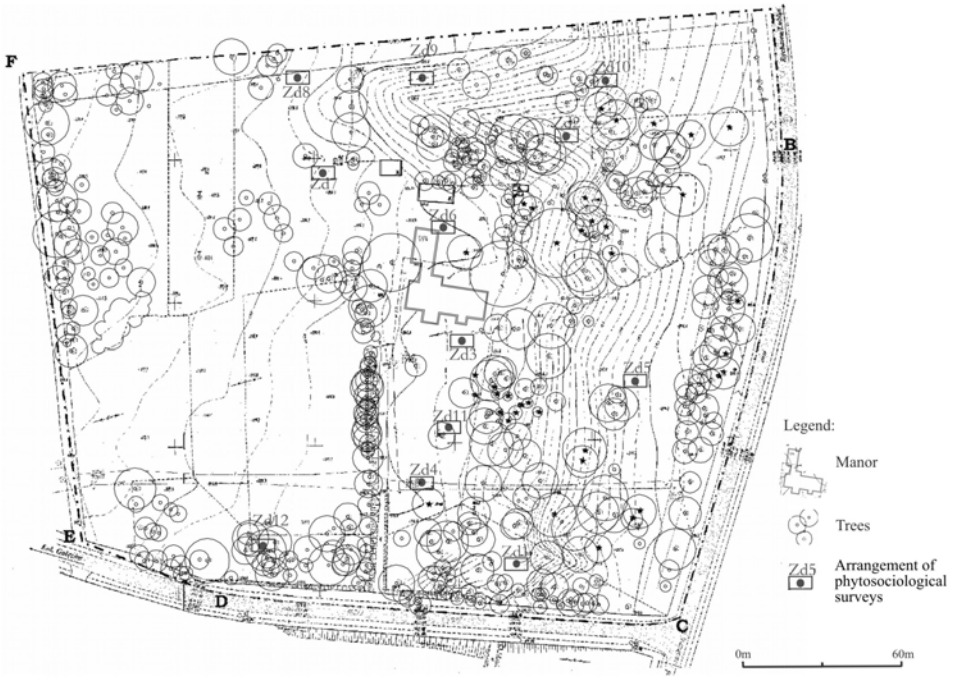


Fig. 1. Arrangement of phytosociological surveys at the Gałęzów ex-manor park

RESULTS AND DISCUSSION

Extremely important part of each landscape constitutes its specific plant cover, which is relatively constant for it, because of orodispersible succession changes. Natural plant communities are the best indicators of changes occurring in given area. Within a Giełczewska Uplift typologically prevail hornbeam forests *Tilio-Carpinetum*, where the tree stand is mainly European hornbeam *Carpinus betulus* with small-leaved lime *Tilia cordata*. In the ground park can be found: *Galium Schultesii, Galium polonicum*, *Isophyrum thalictroides, Carex pilosa, Asperula odorata, Galeobdolon luteum, Viola sylvestris Impatiens nolitangere.* The second potentially forest community are thermophilous oak *Potentillo albae-Quercetum*, often with a substantial share of steppe species ground cover [Fijałkowski1972].

But forests are not in big quantity here, because due to good soil they have been cutted for agricultural purposes. Saved small remnants of natural deciduous forests are characterized by rich species composition. These are mainly oak forests and oak-hornbeam with additives sycamore, linden, maple and other trees [Borowy and Górski 1974]. An example of oak forest residues is small, entered into the register of monuments, forest complex belonging to the Gałęzów ex--manor park. Shrub communities are most strongly represented by blackthorn and hawthorn thicket plant association *Pruno-Crataegetum,* occurring on periphery of the park, but most often overgrown by warm slopes of loess embankment, limiting the east part of the area with ponds. At ponds shrub communities consist mainly different willows species *Salix sp*. but they dominated as community of red-willow shoots *Salicetea purpureae* [Janecki 1999]. Trees growing near ponds are a large predominantly black alder *Alnus glutinosa* and white willow *Salix alba*. A bird cherry *Prunus padus* supplements them. On the slopes of hills there are thermophilous grasslands with steppe character. These grasslands are from *Festuco-Brometea* class and *Festuco-Stipion* association and they dominate in them as loosely tufty growing grasses, especially alfa *Stipa* and fescue *Festuca*, with participation of spring species. The most frequent is the *Sisimbrio-Stipetum capillatae* association [Matuszkiewicz 2001].

Next to the ponds not mowed wet meadows occur, so progressive succession is visible and transformation of wet meadow into herb meadow with many thistle aggregation takes place. Mowed meadows, highly productive, well-fertilized wet meadows *Arrhenatheretum elatiaris* as replacement communities in the circle of dry ground forest communities (*Carpinion*) and some relatively driest alluvial forests, the fine-grained brown soils and brownish alluvial soils with beneficial water relations. Turf grass species dominated here, in particular *Arrhenatherum elatius.* Cultivated fields are occupied mainly by calciphilous synanthropic plants communiteis, such as: *Caucalo Scandicetum, Papaveretum argemonis, Lathyro-Melandrietum, Lamieteto-Veronicetum* oraz *Vicietum tetraspermae,* and cultivated plants [Fijałkowski 1972, Janecki 1999, Matuszkiewicz 2001].

Among twenty-four inventoried tree species within the park, the largest group was represented by *Acer platanoides* (Tab. 1). They formed isolation layers along the land border, separating communication routes from area interior. The next two big groups are alley trees species: *Tilia cordata* and *Carpinus betulus*. Linden planted usually at the border of estates determined their boundaries. While *Carpinus betulus* was used to forming cut tree lane in this case, closure on the west side of interior before the manor. In addition, parts of hornbeam alley were localized in the geometrical garden and some picturesque individuals in the landscape part of park. Also large group of trees were poplars (Tab. 1). Hybrids of this species are planted along the road to Bychawa – Wola Gałęzowska. Unfortunately, these hybrids are old specimens such as this species, and strongly attacked by mistletoe *(Viscum album)* so they should be removed as soon as possible.

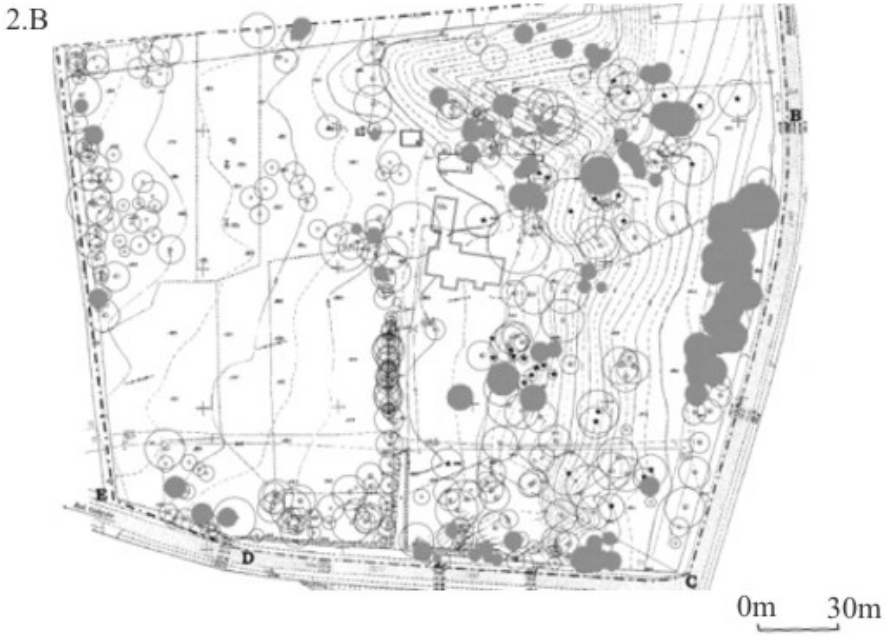
Table 1. Species composition and number of trees assumptions Gałęzów ex-manor park

Latin species name	Quantity
Acer platanoides	83
Acer pseudoplatanus	14
Aesculus hippocastanum	11
Betula pendula	1
Carpinus betulus	36
Crataegus monogyna	9
Fraxinus excelsior	34
Juglans nigra	4
Larix decidua	6
Larix polonica	15
Malus domestica	34
Picea abies	11
Picea pungens	5
Pinus strobus	1
Populus alba	21
Populus x canadensis	37
Prunus padus	9
Prunus sp.	10
Pyrus communis	1
Quercus robur	3
Robinia pseudoacacia	17
Tilia cordata	46
Salix fragilis	1
Ulmus minor	32
Total	441

The smaller group represents fruit trees species located in geometrical garden on the west side of manor and in landscape park part. *Robinia pseudoacacia, Aesculus hippocastanum* and *Fraxinus excelsior* were planted in significant amounts in landscape part of manor park. As native trees they have a decorative effect during flowering, or as in the case of *Fraxinus excelsior* and *Juglans nigra* they formed garden elements – gazebos and shadow arbor.

2.A

2.B



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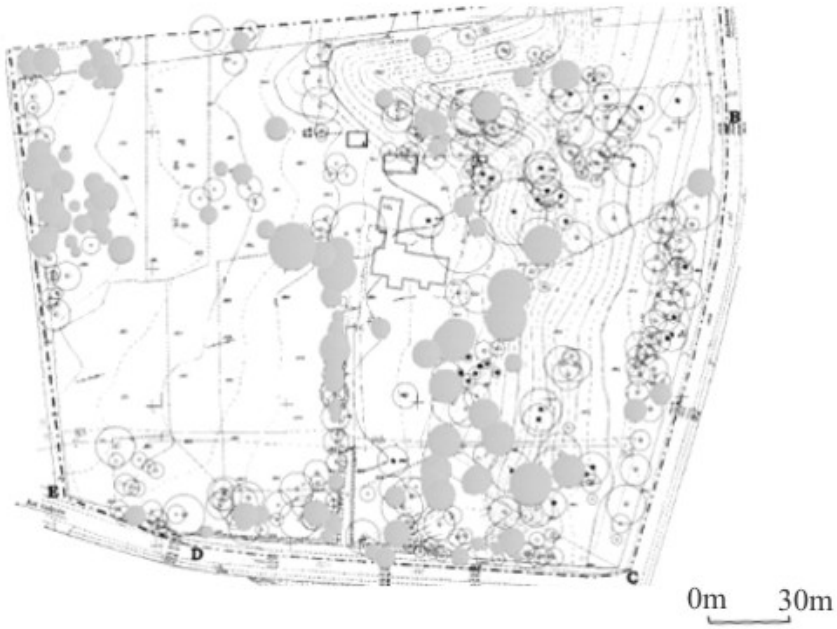
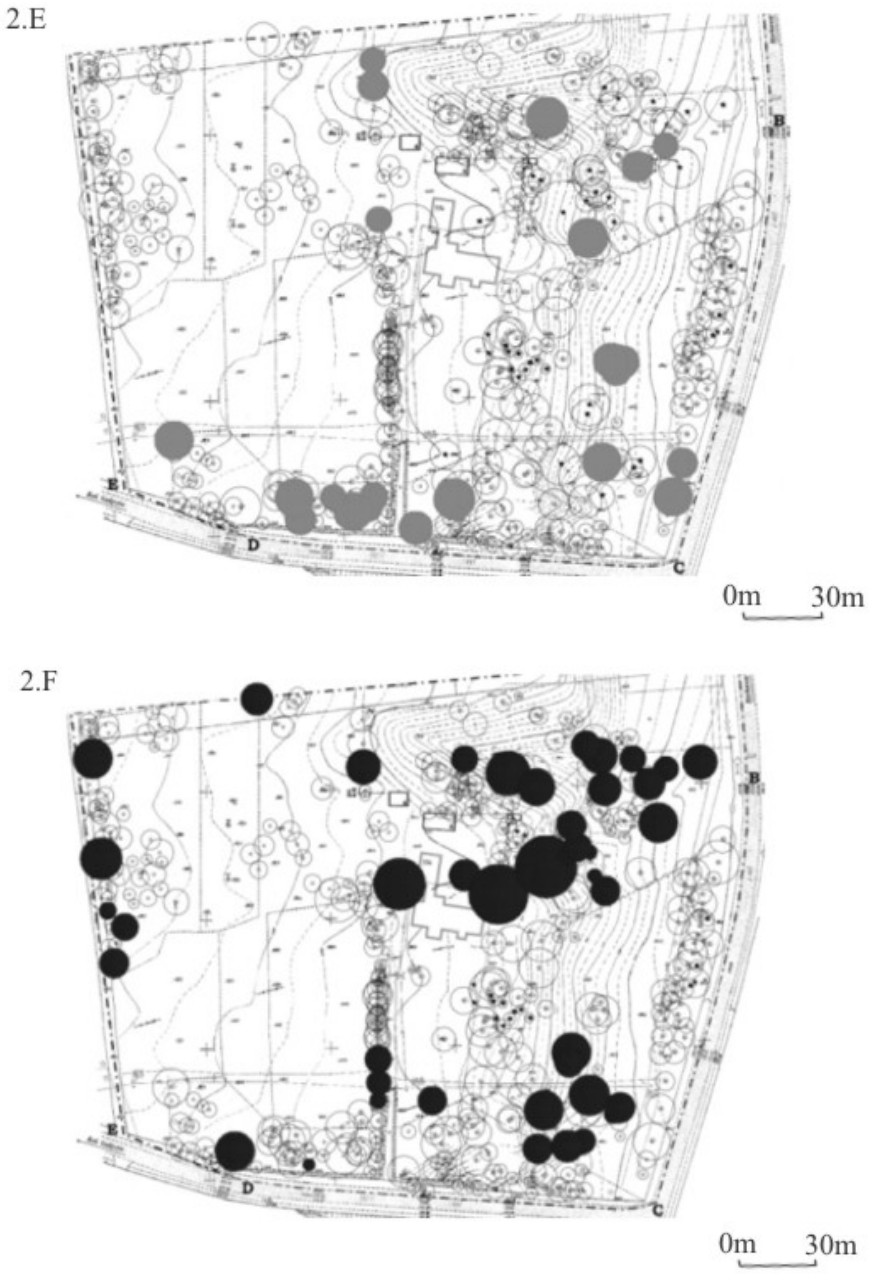


2.D



Legend to figures 2.A–2.F:
The groups of tree age: 2.A ○ 10–20 years old, 2.B ◔ 21–40 years old, 2.C ◑ 41–70 years old, 2.D ◕ 71–100 years old, 2.E ● 101–120 years old, 2. F ● over 121 years old

Fig. 2. Dendrochronological analysis of tree stand park in Gałęzów

Larix deciduas and *Larix polonica* deserve on particular attention. They have been planted with certain intentionally, because the original manor was made by larch balls. Most of larch trees should be considered as nature monuments. The appearance of juvenile sown by wind, shows that this species feel good in this habitat.

Dendrochronological analyzes were carried out, what allowed to identify six groups of tree age. The first age group represents saplings and self-sown trees at age of 10–20 years old. The second group are plantings from postwar period, when the park was used by school, the trees are 21–40 years old. Third group represents pre-war stand beetwen 41 and 70 aged. It includes, for example, an inserted here after 1929 hornbeam lane, when the cold winter caused upfreezing plane trees alley. The fourth group consists trees between 71–100 years old, and the fifth between 101–120 years old dates from time when the manor was managed by Koźmian family. The sixth group includes venerable trees more than 120 years old.

The most numerous age group represents trees at 41 to 70 years old, from period about 1940–1970 years. Tree stand in this age group is well preserved. It includes primarily species such as: *Acer platanoides, Acer pseudoplatanus, Carpinus betulus, Populus alba, Robinia pseudoacacia* and *Fraxinus excelsior*.

In the group of younger trees were all tree species with predominant *Robinia* and *Populus*. These trees are very expansive and quickly occupy spaces undergrowth. Saplings represent a significant percentage of young lime trees and maples which are forming suckers and can be easily seeds sowing (Fig. 2).

The second aged group contains generally poplars, situated between landscape part of park, and ponds. They also include younger maples saplings spread throughout the park and Robin.

Smaller quantities are the trees from the IV and V age group. They are significantly well-preserved, but often need to be treated. Many of them are located in the geometric and landscape part of manor park, including an *Juglans nigra* arbor (Fig. 2).

Trees over 120 years (VI age group) are a testimony of time and history in Gałęzów. There are many natural monuments designated under the „protection natural monuments, principles of administrative procedure" from 2005. Many of them were in excellent condition, for example common oak marked number 2, and most of Polish larch, because as follows from dendrochronological analysis, European larches were planted a bit later and are characterized by smaller trunk diameter. More than 120 years old there are also some of: *Acer platanoides, Tilia cordata* and *Pinus strobus*, which is one of the most interesting elements of the tree stand park.

Park under growth was very varied. In spring vegetation characteristic for a typical oak-hornbeam forest appeared: *Tilio cordatae-Carpinetum betuli* and *Ficario-Ulmetum minoris* in depressions. Among them occurred: *Ficaria verna, Gagea lutea, Pulmonaria officinali, Viola odorata, Anemone nemorosa*.

There were individual areas with a typical oak-hornbeam forest habitat and in the lower parts of the elm-ash riverside habitat.

Table 2. Floristic undergrowth diversity in Gałęzów ex-manor park

No of the survey	2	3	4	7	1	5	8	9	6	10	11	12	13
Area, m^2	25	10	150	10	10	25	25	10	10	10	10	25	25
Covering, %	94	99	60	100	96	90	100	100	100	100	100	100	100
Acer pseudoplatanus													2.1
Achillea millefolium	2.2				1.3								
Aegopodim podagraria	3.4		2.2	3.4			1.2	4.5	3.4	2.2	2.2		2.2
Agropyron repens	1.2	1.2		1.2									
Agrostis capilaris													1.2
Alchemilla vulgaris	2.2			r									
Alopecurus pratensis		3.4											
Anemone nemorosa			3.3									3.4	
Anthoxanthum odoratum		2.3											
Arctum majus						1.3							
Artemisia vulgaris					1.1								
Bellis perennis					3.2	2.3							
Cerastium biebersteini				+									
Cirsium vulgare				+	+				+				
Crataegus monogyna													+
Dactylis glomerata	3.3	1.3		r.3	3.3	1.2			2.3				
Daucus carota	1.1								+				
Deschampsia caespitosa	2.3												
Dryopteris filix-mas			2.2										
Epilobium angustifolium				+	1.1								
Festuca arundinacea	2.2	2.2			1.2								
Ficaria verna	2.4							2.3		3.4		2.2	2.3
Gagea lutea										3.3			
Galium aparine	2.2		1.2		+		r				3.4		
Galium odoratum	1.3		2.3										
Geranium pratense	2.2	2.2					2.1				1.3		
Geum urbanum			1.2			2.1		1.1					1.1
Glechoma hederacea					1.2	1.1							
Hemerocallis sp.					+								
Hypericum perforatum				+									
Lamium album				1.1									+
Lamium galeobdolon			2.3										
Lysimachia nummularia		+											
Maianthemum bifolium			1.2										
Milium effusum						3.2							
Narcissum sp.					+				1.3				
Oxalis acetosella			1.3										
Pimpinella saxifraga	2.3	1.2				1.2			2.3		2.3		
Plantaga major					2.1	1.2							
Poa annua	2.3	2.2			3.4	2.3							
Poa compressa						2.3							
Poa trivialis		1.2									1.2		
Populus tremula						2.1							
Potentilla anserina	1.2				2.2	2.3							
Prunella vulgaris					r								
Prunus avium				r									
Prunus syriaca									1.1				1.1
Pulmonaria officinalis	2.3		1.2									2.3	
Ranunculus acris		2.1			1.1								
Ranunculus repens						3.3							
Rumex acetosella		2.1											
Rumex conglomeratus						2.3							
Rumex crispus	1.2												
Salix aurita						2.1							
Salix longifolia						1.1							

Sambucus nigra				r									
Stellaria media					2.2								
Symphytum officinale		1.3		+					2.3				
Taraxsacum officinale	2.2	+			3.3	2.2							
Trifolium repens					3.3	2.2							
Tussilago farfara						2.2							
Ulmus minor													+
Urtica dioica			1.1	4.4	1.2	2.2	4.5		2.3		3.4		
Veronica persica	1.2	2.2		1.2	2.3	1.2			3.2				
Viola odorata			2.2							2.2		3.4	4.5
Viola reichenbachiana			1.2					1.2					

Closer to farm buildings and manor appeared plants associated with human activities. Primarily numerous plantings decorative garden plants such as lily or narcissus certainly coming from the postwar period. There appear also numerous species characteristic for ruderal communities and trampled grasslands. These are the following species: *Lolium perenne, Rumex acetosa, Plantago major, Artemisia vulgaris, Urtica dioica, Bellis perennis, Glechoma hederacea, Aegopodium podagraria*. In warmer months of year, *Urtica dioica* and *Aegopodium podagraria* dominate. Equally numerous can be observed species such as: *Galium aparine, Taraxsacum officinale*, and on lower parts of park *Symphytum officinale* and *Ranunculos sp.* appeared.

Near the ponds there are meadow species prefer more humid habitats, such as*: Mentha sp*. and *Plantago media*. Unfortunately, due to lack of mowing and drying ponds, patches of this vegetation are significantly reduced. In case of continued negligence, these habitats will be further succession.

Near sources appeared community of *Ranuculus trichophyllus*. Either ponds vegetation (*Phragmitetum australis* community) and plants near sources indicates eutrophication and pollution of theses ecosystems.

In addition to herbaceous plants individuals from the kingdom of fungi occurred, for example in spring fruiting bodies *Graphium ulmi* which causes Dutch elm disease.

The state of health and condition of described park tree stand can be defined as bad. Many trees have abolished a long period of ill-abandonment and lack of tending and conservation treatments.

Negligence of tree stand was progressing gradually and successively. Destruction of wars, changed the function of the complex on school grounds, also lack of proper use has an effect on the current health tree stand status. First of all, it is necessary to remove windbreaks, trees and damage for example as broken, hanging in the crown branches, posing risk for human health. Equally important it is to clear the deadwood from crowns and treatment of cavity loss, chimney loss, surface wounds, etc. especially in valuable, historic specimens. In many cases, damages stand tree are so extensive that it will need to be cutted. Part of the self-sown trees and shrubs dense growing in undergrowth trees should be also eliminated in order to extract essence of the composition and provide space for recreation.

CONCLUSIONS

Village park-and-palace complexes represent a place with exceptionally rich biodiversity, due to a high habitats diversification. They perform function of the refuge for many flora and fauna species and they are also sites of high historical values.

Park in Gałęzów is a place of occurrence diverse tree stand, especially trees with a monumental character, but because of vicissitudes they require many urgent care.

Species of park undergrowth show high diversity, which demonstrates that these are enclaves of biological life in agricultural area.

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ZESPOŁY DWORSKO-PAŁACOWE JAKO OSTOJE RÓŻNORODNOŚCI BIOLOGICZNEJ NA PRZYKŁADZIE PARKU PODWORSKIEGO W GAŁĘZOWIE

Streszczenie. Podworskie parki wiejskie zajmują szczególne miejsce w polskim krajobrazie. Zawierają cenne wartości historyczne i kulturowe. Pełnią funkcje dydaktyczne, społeczne, krajobrazowe i przyrodnicze. Na tych terenach często skupia się najwięcej drzew pomnikowych. Celem badań było określenie zróżnicowania gatunkowego roślinności założenia dworsko-parkowego w Gałęzowie na podstawie inwentaryzacji dendrologicznej i florystycznej, a także analiza dendrochronologiczna. Spośród dwudziestu czterech zinwentaryzowanych na terenie parku gatunków drzew największą grupę stanowiły klony pospolite. Kolejne dwie duże grupy to gatunki drzew alejowych: lipa drobnolistna oraz grab pospolity. Równie dużą grupę stanowiły topole. Na uwagę zasługują wiekowe modrzewie europejskie i polskie. Większość z nich ma parametry pomników

przyrody i zasługuje na właściwą ochronę. Pojawienie się wysianego przez wiatr, młodego osobnika świadczy, że gatunek ten dobrze czuje się na tym siedlisku. Przeprowadzone analizy dendrochronologiczne drzewostanu pozwoliły wyróżnić sześć grup wiekowych. Ilościowo największą grupę wiekową stanowią drzewa w wieku od 41 do 70 lat. Są to drzewa pochodzące z 1940–1970 lat. Drzewa w wieku powyżej 120 lat są świadectwem czasu i historii w Gałęzowie. W tej grupie znajdują się wspomniane modrzewie oraz piękny dąb szypułkowy rosnący przy dworze, które powinny być objęte ochroną pomnikową.

Słowa kluczowe: park po dworski, drzewostan, zbiorowiska roślinne, bioróżnorodność