



## THE CHARACTERISTIC OF THE ARCHAEOPHYTES APPEARING IN THE AREA OF THE CEDYŃSKI LANDSCAPE PARK (NW POLAND) – DISTRIBUTION, HABITAT CONDITIONS, THE DEGREE OF NATURALIZATION AND PRESENT THREATS

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### SYNOPSIS

On the basis of the original field studies made in 1998-2003 and historical data received during 149 years of geobotanical investigations carried out in the area of Cedyński Landscape Park 105 species of archaeophytes were found. The most number of archaeophytes appear occasionally on the natural and seminatural habitats (44 species), or do not appear on this habitats at all (19 species), like *Hordeum murinum* L. Remaining archaeophytes indicate great attachment for this type of habitats (19 species) and 6 species became fully naturalized, like *Carduus crispus* L. During the author's present research 17 species of archaeophytes which were noticed by previous authors was not found at all, and up to 40% species was considered as rare and very rare (35 species).

### INTRODUCTION

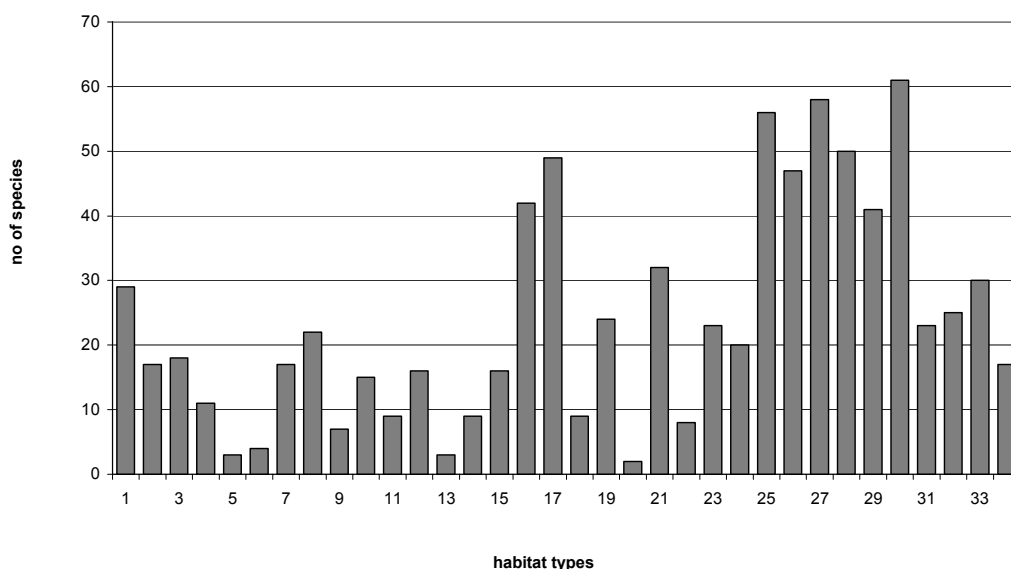
Owing to the growing pressure of man on the natural environment deep changes are occurring in the vegetal cover of the Globe. The intensified agriculture and forest production, the technological progress, increasing urbanization and traffic problems contribute to the constantly decreasing area of natural biocenoses while habitats of anthropogenic character of a different structure and frequently with a high participation of species of alien origin are developing instead. The invasion of alien species and their gradual penetration into biocenoses of semi-natural or natural character present one of the aspects of the synanthropisation of the vegetal cover. The process of the impoverishing species divergence of the natural flora occurs on a large scale even within the previously developed segetal and ruderal communities. Archeophytes, alien species domesticated by man a long time ago, now give in to the growing pressure and recede from their former habitats.

The aim of the work is to recognize the condition, distribution, spread, the main roads of migration and habitat preferences as well as the degree of naturalization of archeophytes occurring in the Cedyński Landscape Park.

## MATERIALS AND METHODS

Floral data, used for drawing up of a complete list of archeophytes, they were obtained from the source materials carried on over 149 years of geobotanic studies on the area of the Park and, basis own terrain studies carried out during the years 1998-2003.

Within the research area was 337 basic fields were distinguished – each square with 1 km long side. Within such net, the so-called small squares (10 km), forming the cartogram system conforming the Polish vascular plants distribution Atlas – ATPOL (ZAJAĆ, 1978) were established. Within the framework of basis fields, the occurrence of archeophytes in 33 distinguished habitats of a natural, seminatural and anthropogenic character was noted (Fig. 1).



**Fig. 1.** The frequency of archaeophytes in different types of habitat (1 – sides of rivers, lakes and small water-bodies, 2 – sides of channel and drainage ditch, 3 – broadleaf forests >60 years, 4 – broadleaf forests 20-60 years, 5 – mixed forests >60 years, 6 – mixed forests >60 years, 7 – pine monocultures >60 years, 8 – pine monocultures 20-60 years, 9 – osier hopes, 10 – xerothermophilous shrubs, 11 – heathlands, 12 – mid-field scrub and boundary strips, 13 – transitional and raised bogs, 14 – lowland bogs, 15 – flooded grasslands, 16 – meadows and pastures, 17 – xerothermic, sandy and dry grasslands, 18 – clearings, 19 – greenwoods, 20 – Douglas fir and spruce monocultures, 21 – robinia forests, 22 – old ramparts, 23 – parks and cemeteries, 24 – former homesteads, 25 – by-cottage and by-fence areas, 26 – ploughlands, 27 – abandoned fields, 28 – field-pathsides, 29 – forest unmetalled roadsides, 30 – metalled roadsides, 31 – roadside scarps, 32 – embankments, 33 – gravel-pits and sand-pits, 34 – railway).

Taxa identified before 1945 and not confirmed in the following period, and those found on particular stands after 1945 whose habitats could be undoubtedly considered

as destroyed were given the status of extinct species. Taxa known from the period after 1945 and not found during the field research of 1998-2003 were ascribed as missing.

In order to determine the distribution of particular taxa in the Park area a frequency of occurrence scale was constructed. The frequency classes were based on the intervals of percentage content of a given taxon stands in relation to the total stands number (337) (Tab. 1).

Frequency class	Frequency description	% of localities	Number of localities	Number of taxa	% of taxa
I	very rare	≤1,0	1-3	19	21,8
II	rare	1,1-3,0	4-10	15	17,2
III	fairly rare	3,1-6,0	11-20	15	17,2
IV	widespread	6,1-12,1	21-40	12	13,8
V	frequent	12,1-25,0	41-84	12	13,8
VI	very frequent	25,1-50,0	85-168	13	15,1
VII	common	50,1-100,0	169-337	1	1,1

**Table 1. Scale of frequency of archeophytes occurrence in the Cedyński Landscape Park area in recent times.**

An ability towards naturalization of the archeofits (possibility of occupying of the oligo- and mezohemeroby – habitats of natural and seminatural character) has been presented by means of Indicator of naturalization – Inat (Jackowiak 1990):

$$\text{Inat} = \frac{\Sigma \text{ of oligo- and mesohemerobic localities}}{\Sigma \text{ all localities of species}}$$

The habitat requirements expressed as indicator values was reported by ELLENBERG (1991).

The status of the archeophytes has been given according to the works of ZAJĄC E. U. & ZAJĄC A. (1975); ZAJĄC A. (1979, 1983, 1987a, 1987b, 1988); ZAJĄC A. & ZAJĄC M. (2001); MIREK Z., PIĘKOŚ-MIRKOWA A., ZAJĄC A., ZAJĄC M. (2002).

The nomenclature of taxa according to MIREK et al. (2002) was applied.

## RESULTS

As the result of own studies and of an analysis of the source materials, a list of 105 species of archeofits observed in the Park during the years 1854-2003 has been drawn up (Tab. 2). The three species has been acknowledged as extinct ones, that is – *Chenopodium ficifolium*, *Fumaria schleicheri*, *Fumaria vaillantii*.

There are 14 species which have not been found or acknowledged to be disappeared. There are 87 species in the area of the Park presently (species noted by the authoress during the years 1998-2003). From among the last ones, 39.1% of them are very rare and rare species, therefore they are in danger to become extinct. Among them, the species mostly appearing in the habitats of an anthropogenic character (24 species) – like is the case of *Malva neglecta*, *Fumaria officinalis*, *Veronica polita*, are the prevailing ones. However, there are also species which prefer seminatural habitats (5 species), like *Carduus nutans*, *Nepeta cataria*, *Odontites verna*, and those which appear in both types of the habitats (6 species) – like *Chenopodium urbicum*, *Anthriscus cerefolium*, *Senecio vulgaris*. There are 16.2% of the species which are appearing in the Park very frequently, like *Apera spica-venti*, *Geranium molle*, *Melandrium album*, inter alias as well as *Fallopia convolvulus* – the common species in the Park. These archeophytes, they prefer anthropogenic habitats except the last one which is found more frequently in seminatural habitats but also in natural habitats (Fig. 2 B).

Only 6 species of archeophytes became naturalized entirely in the habitats of natural and seminatural character ( $Inat > 0,66$ ) (Fig. 3), like is the case of *Camelina microcarpa* subsp. *sylvestris* (Fig. 2 A), *Carduus nutans*. The majority of the species (72%), they appear occasionally there – 44 species ( $0,01 < Inat \leq 0,33$ ), like *Anagallis arvensis* (Fig. 2 C), and even do not appear at all there – 19 species ( $Inat < 0,33$ ) like is the case of *Agrostemma githago*, *Sisymbrium officinale* (Fig. 3).

No	Species	Frequenc y class	Inat	LF	L	F	R	N
1	<i>Adonis aestivalis</i> L.	m	-	T	6	3	8	3
2	<i>Aethusa cynapium</i> L.	I	0	T	6	5	8	6
3	<i>Agrostemma githago</i> L.	II	0,11	T	7	-	-	-
4	<i>Anagallis arvensis</i> L.	IV	0,09	T	6	5	-	6
5	<i>Anchusa arvensis</i> (L.) M. Bieb.	II	0,50	T	7	4	-	4
6	<i>Anchusa officinalis</i> L.	VI	0,27	H	9	3	7	5
7	<i>Anthemis arvensis</i> L.	m	-	T	7	4	6	6
8	<i>Anthemis cotula</i> L.	I	0	T	7	4	-	5
9	<i>Anthriscus caucalis</i> M. Bieb.	III	0,17	T	8	5	6	6
10	<i>Anthriscus cerefolium</i> (L.) Hoffm.	I	0,5	T	6	5	-	8
11	<i>Apera spica-venti</i> (L.) P. Beauv.	VI	0,07	T	6	6	5	-
12	<i>Aphanes arvensis</i> L.	m	-	T	6	6	-	5
13	<i>Armoracia rusticana</i> P. Gaertn., B. Mey. & Scherb.	III	0,3	G	8	5	-	9
14	<i>Artemisia absinthium</i> L.	V	0,19	Ch	9	4	7	8
15	<i>Atriplex nitens</i> Schkuhr	m	-	T	9	-	7	7
16	<i>Atriplex rosea</i> L.	m	-	T	9	5	7	7
17	<i>Avena fatua</i> L.	III	0,21	T	6	5	7	-
18	<i>Ballota nigra</i> L. subsp. <i>nigra</i>	VI	0,28	C	8	5	-	8
19	<i>Berteroa incana</i> (L.) DC.	VI	0,24	H	9	3	6	4

20	<i>Bromus sterilis</i> L.	VI	0,24	T	7	4	-	5
21	<i>Bromus tectorum</i> L.	III	0,54	T	8	3	8	4
22	<i>Camelina microcarpa</i> Andr. subsp. <i>sylvestris</i> (Wallr.) Hiitonen	III	0,94	T	7	4	8	4
23	<i>Capsella bursa-pastoris</i> (L.) Medik.	VI	0,12	H	7	5	-	6
24	<i>Carduus acanthoides</i> L.	m	-	H	9	4	8	7
25	<i>Carduus nutans</i> L.	II	0,86	H	8	4	8	6
26	<i>Centaurea cyanus</i> L.	V	0,08	T	7	-	-	-
27	<i>Chamomilla recutita</i> (L.) Rauschert	II	0,09	T	7	5	5	5
28	<i>Chenopodium bonus-henricus</i> L.	I	0	C	8	5	-	9
29	<i>Chenopodium ficifolium</i> Sm.	ex	-	T	7	6	-	7
30	<i>Chenopodium hybridum</i> L.	III	0,07	T	7	5	8	8
31	<i>Chenopodium murale</i> L.	m	-	T	8	4	8	9
32	<i>Chenopodium urbicum</i> L.	II	0,5	T	7	4	7	7
33	<i>Cichorium intybus</i> L. subsp. <i>intybus</i>	V	0,08	H	9	4	8	5
34	<i>Cirsium vulgare</i> (Savi) Ten.	VI	0,4	H	8	5	7	8
35	<i>Conium maculatum</i> L.	m	-	T	8	6	-	8
36	<i>Consolida regalis</i> Gray	V	0,26	T	6	4	8	5
37	<i>Descurainia sophia</i> (L.) Webb ex Prantl	V	0,2	T	8	4	-	6
38	<i>Digitaria ischaemum</i> (Schreb.) H. L. Muhl.	II	0	T	7	5	2	3
39	<i>Digitaria sanguinalis</i> (L.) Scop.	I	0	T	7	4	5	5
40	<i>Echinochloa crus-galli</i> (L.) P. Beauv.	II	0,18	T	6	5	-	8
41	<i>Erysimum cheiranthoides</i> L.	IV	0,41	T	7	5	7	7
42	<i>Euphorbia exigua</i> L.	I	0	T	6	4	8	4
43	<i>Euphorbia helioscopia</i> L.	III	0,24	T	6	5	7	7
44	<i>Euphorbia peplus</i> L.	IV	0,44	T	6	4	-	7
45	<i>Fallopia convolvulus</i> (L.) A. Love	VII	0,56	T	7	5	-	5
46	<i>Fumaria officinalis</i> L.	I	0	T	6	5	6	7
47	<i>Fumaria schleicheri</i> Soy.-Will.	ex	-	T	7	4	8	7
48	<i>Fumaria vaillantii</i> Loisel.	ex	-	T	-	-	-	-
49	<i>Gagea arvensis</i> (Pers.) Dumort.	II	0,33	G	6	4	6	5
50	<i>Galium spurium</i> L.	m	-	T	7	5	8	5
51	<i>Geranium columbinum</i> L.	m	-	T	7	4	7	7
52	<i>Geranium dissectum</i> L.	I	1	T	6	5	8	5
53	<i>Geranium molle</i> L.	VI	0,17	T	7	4	5	4
54	<i>Geranium pusillum</i> Burm. F. ex L.	VI	0,21	T	7	4	-	7
55	<i>Hordeum murinum</i> L.	III	0	H	8	4	7	5
56	<i>Hyoscyamus niger</i> L.	m	-	H	8	4	7	9
57	<i>Lactuca serriola</i> L.	VI	0,31	H	9	4	7	7
58	<i>Lamium album</i> L.	V	0,14	H	7	5	-	9
59	<i>Lamium amplexicaule</i> L.	II	0,14	T	6	4	7	7
60	<i>Lamium purpureum</i> L.	V	0,36	T	7	5	7	7
61	<i>Lathyrus tuberosus</i> L.	III	0,53	H	7	4	8	4
62	<i>Leonurus cardiaca</i> L.	III	0,33	H	8	5	8	9
63	<i>Lepidium campestre</i> (L.) R. Br.	I	0	T	7	4	8	6
64	<i>Lepidium ruderale</i> L.	II	0,44	H	9	4	-	6
65	<i>Lithospermum arvense</i> L.	III	0,65	T	5	-	7	5

66	<i>Malva neglecta</i> Wallr.	II	0	H	8	5	7	9
67	<i>Malva pusilla</i> Sm.	I	0	H	8	4	5	5
68	<i>Malva sylvestris</i> L.	IV	0,07	H	8	4	7	8
69	<i>Matricaria maritima</i> L. subsp. <i>inodora</i> (L.) <i>Dostal</i>	VI	0,15	H	7	-	6	6
70	<i>Melandrium album</i> (Mill.) Garcke	VI	0,26	T	8	4	-	7
71	<i>Myosotis arvensis</i> (L.) Hill	IV	0,22	T	6	5	-	6
72	<i>Nepeta cataria</i> L.	I	1	C	8	4	7	7
73	<i>Nigella arvensis</i> L.	I	0	T	8	3	9	3
74	<i>Odontites verna</i> (Bellardi) Dumort.	I	1	T	6	5	6	5
75	<i>Onopordum acanthium</i> L.	II	0,11	H	9	4	7	8
76	<i>Papaver argemone</i> L.	II	0,38	T	6	4	5	5
77	<i>Papaver dubium</i> L.	V	0,27	T	6	4	5	5
78	<i>Papaver rhoeas</i> L.	V	0,11	T	6	5	7	6
79	<i>Parietaria officinalis</i> L.	I	0	H	5	5	7	7
80	<i>Raphanus raphanistrum</i> L.	I	1	T	6	5	4	6
81	<i>Scleranthus annuus</i> L.	III	0,21	T	6	5	2	5
82	<i>Senecio vulgaris</i> L.	II	0,57	H	7	5	-	8
83	<i>Setaria pumila</i> (Poir.) Roem. & Schult.	I	0	T	7	4	5	6
84	<i>Setaria verticillata</i> (L.) P. Beauv.	m	-	T	7	4	-	7
85	<i>Setaria viridis</i> (L.) P. Beauv.	IV	0,13	T	7	4	-	7
86	<i>Sherardia arvensis</i> L.	m	-	T	6	4	7	5
87	<i>Sinapis arvensis</i> L.	III	0,25	T	7	-	8	6
88	<i>Sisymbrium officinale</i> (L.) Scop.	IV	0,1	T	8	4	-	7
89	<i>Solanum nigrum</i> L. emend. Mill.	I	0	T	7	5	7	8
90	<i>Sonchus asper</i> (L.) Hill	III	0,25	T	7	6	7	7
91	<i>Sonchus oleraceus</i> L.	IV	0,14	H	7	4	8	8
92	<i>Spergula arvensis</i> L.	IV	0,22	T	6	5	3	6
93	<i>Thlaspi arvense</i> L.	III	0	T	6	5	7	6
94	<i>Urtica urens</i> L.	II	0,09	T	7	5	-	8
95	<i>Valerianella dentata</i> (L.) Pollich	m	-	T	7	4	7	-
96	<i>Valerianella locusta</i> Laterr. emend. <i>Betcke</i>	IV	0,47	T	7	5	7	6
97	<i>Verbena officinalis</i> L.	I	0	H	9	5	7	7
98	<i>Veronica opaca</i> Fr.	I	0	T	5	4	8	6
99	<i>Veronica polita</i> Fr.	II	0	T	5	4	8	7
100	<i>Veronica triphyllos</i> L.	IV	0,5	T	6	4	-	4
101	<i>Vicia hirsuta</i> (L.) Gray	V	0,37	T	7	2	3	2
102	<i>Vicia sativa</i> L.	IV	0,5	T	5	-	-	-
103	<i>Vicia tetrasperma</i> (L.) Schreb.	VI	0,33	T	6	5	5	5
104	<i>Vicia villosa</i> Roth	V	0,39	T	7	4	6	5
105	<i>Viola arvensis</i> Murray	V	0,2	T	6	-	-	-

Table 2. List of archaeophytes recorded in Cedyński Landscape Park (Frequency class I-VII, m – missing species, ex – extinct species; Inat - Indicator of naturalization; LF – Raunkiaer's life forms: Ch – Chamaephyte, H – Hemicryptophyte, T – Terophyte, G – Geophyte; Ellenberg indicator values: L – Light indicator value, F – Moisture indicator value, R – Soil (water) acidity (pH) indicator value, N – Nitrogen indicator value).

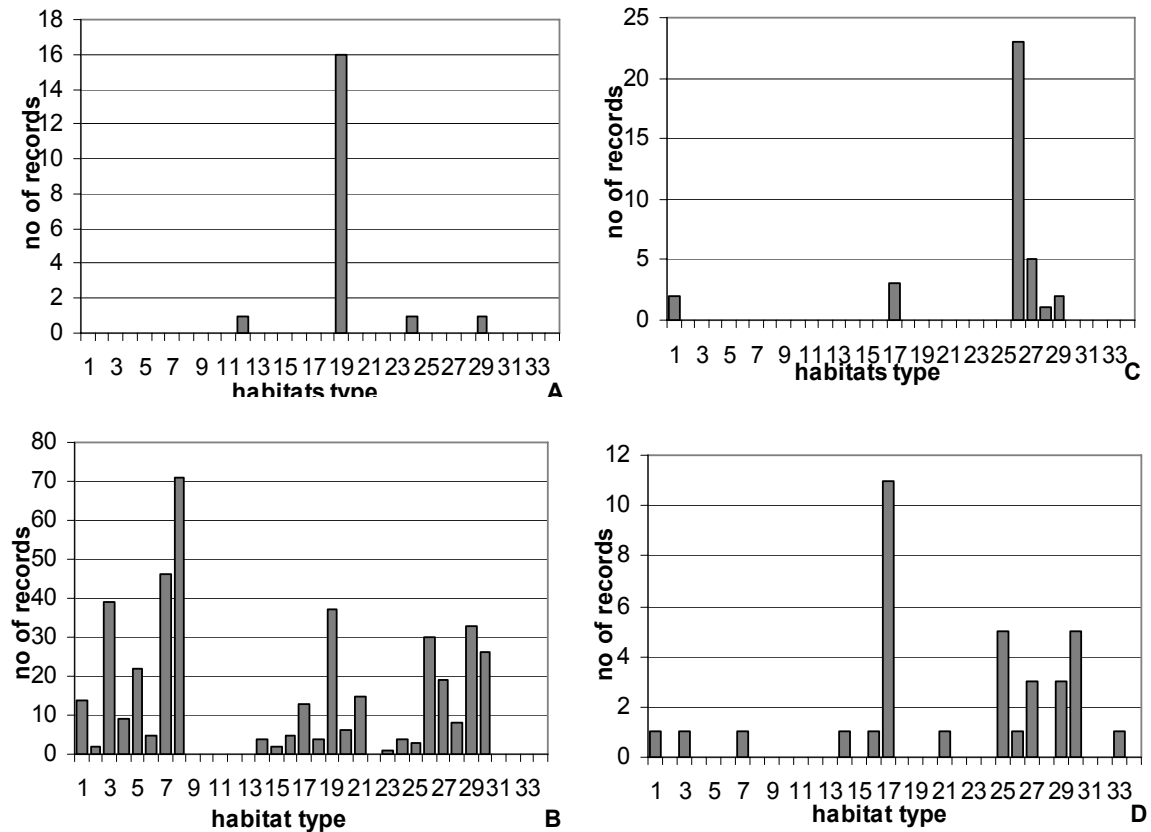


Fig. 2. Frequency of selected archeophytes in the different types of habitats (1-34 – types of habitats according to the Fig. 1, A – *Camelina microcarpa* Andr. subsp. *sylvestris* (Wallr.) Hiitonen, B – *Fallopia convolvulus* (L.) A. Love, C – *Anagalis arvensis* L., D – *Euphorbia peplus* L.).

Most archeophytes are terophytes and hemicryptophytes (Fig. 4). With regard to the habitat requirements expressed as Ellenberg's indicator values (ELLENBERG, 1991) the prevailing archeophytes prefer full light or a slight shading (Fig. 5), fresh soils (Fig. 6) from weakly acid to weakly basic reaction (Fig. 7) and of moderately or fairly high nitrogen content (Fig. 8).

The majority of the archeophytes species, they are grouped along the edge of the river Odra valley, between Stare Objezierze and Mętno as well as in the region of Stoki (Fig. 9). It is related with appearance of the habitats on these areas which are willingly peopled by archeophytes like xerothermic grassland, meadows, pastures, abandoned fields, roadsides and ploughlands.

The fewest species have been observed in typical forest areas and, especially, where there is lack of communication routes and much frequented forest fire-lanes within particular squares.

The reaches places where the species of archeophytes observed, considering their quantity, are the roadsides (70 species in total) (Fig. 1). Considering localization of roads and intensity of vehicles traffic, the biggest number of archeophytes is related with the edges of hard-surfaced roads which are main communication routes in the Park (61 species). Almost equally reach in species are the abandoned fields (58 species) which surpass in this respect the ploughlands where 47 species have been noted. There 56 species which are growing on by-cottage and by-fence areas. The xerothermic and sandy grasslands, as well as dry grasslands, they are the habitat where 49 species of archeophytes exist. Also many of them have been noted on damp meadows and pastures – 42 species.

The fewest number of archeophytes species occurs in mixed forests, both in old ones and relatively young ones alike. The most frequent notes species was *Fallopia convolvulus* (Fig. 2 B). Equally poor in archeophytes are the transitional and reised bogs. Only three species appeared there: *Cirsium vulgare*, *Echinochloa crus-galli* i *Leonurus cardiaca*. A few of species of archaeophytes occurs in lowland bogs and osier hopes. There were three species (*Cirsium vulgare*, *Fallopia convolvulus*, *Melandrium album*, *Matricaria maritima*) most frequently. It also calls attention small number of archeophytes in dark spruce and Douglas fir forest stands and, in particular, when we compare it with forest stands of other kenophyte in the Park, which is false acacia. The false acacia small forests became the habitat of up to 32 species of archeophytes.

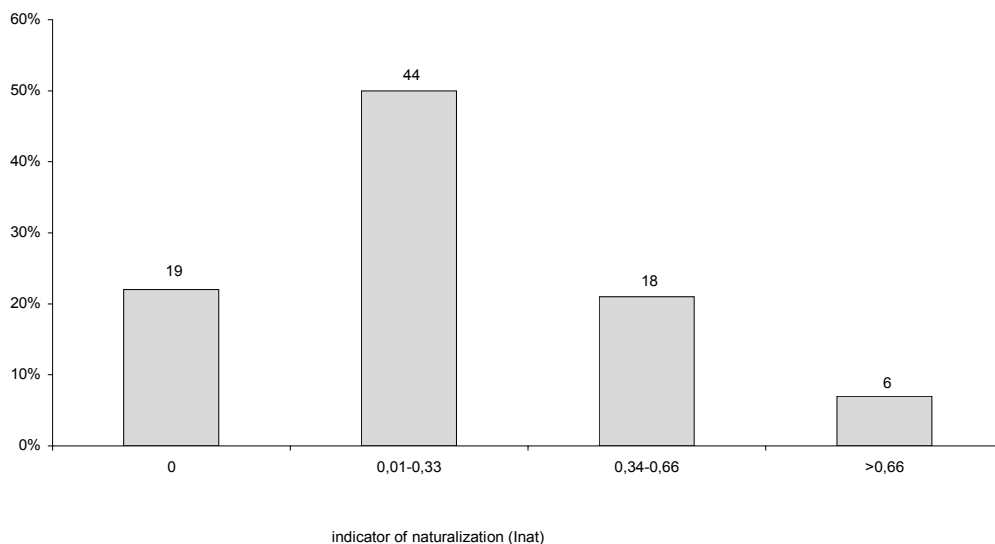
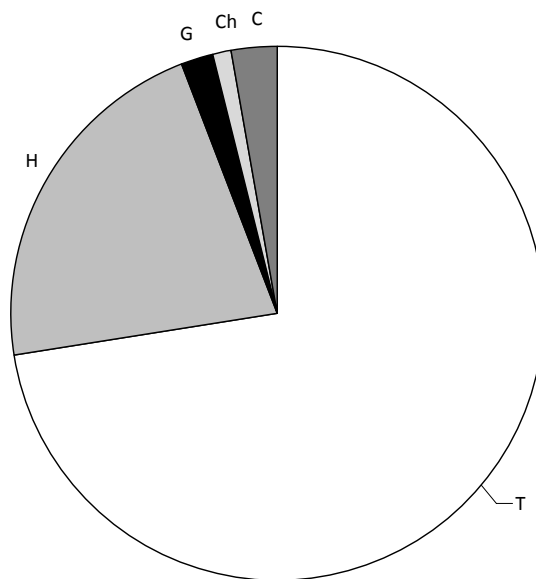
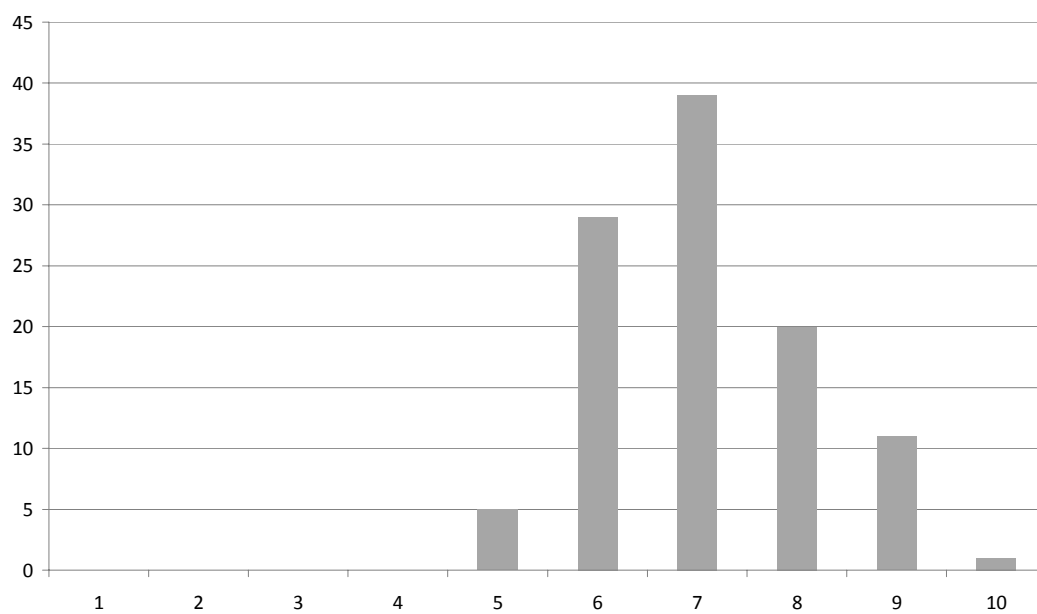


Fig. 3. Percentage of archeophytes in groups with different indicator of naturalization Inat.



**Fig. 4. Percentages of life forms of archeophytes occurring in CLP (Explanation of signs in Table 2).**



**Fig. 5. Ranges of Light (L) indicator value.**

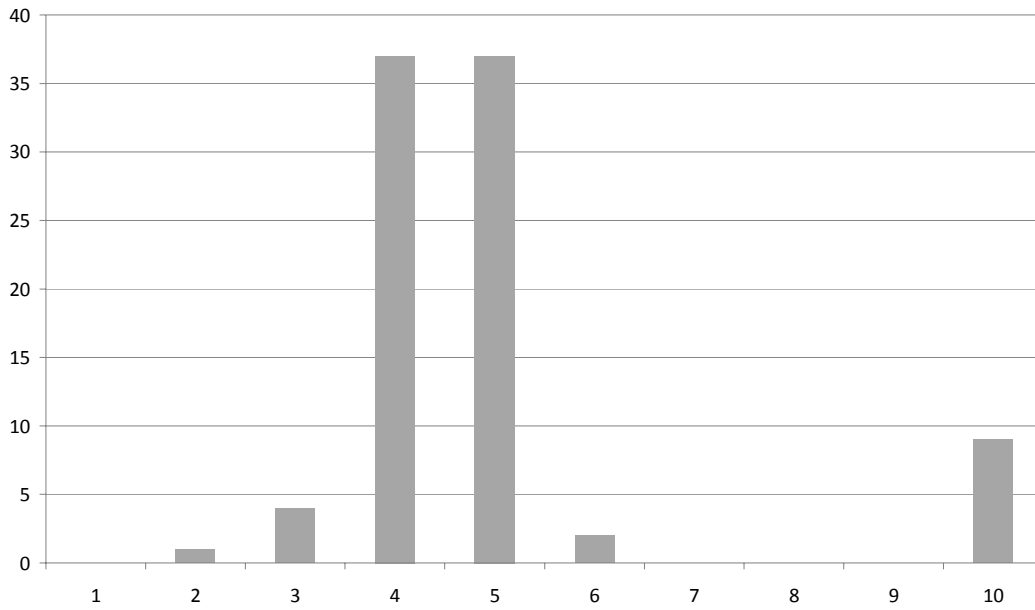


Fig. 6. Ranges of Moisture (F) indicator value.

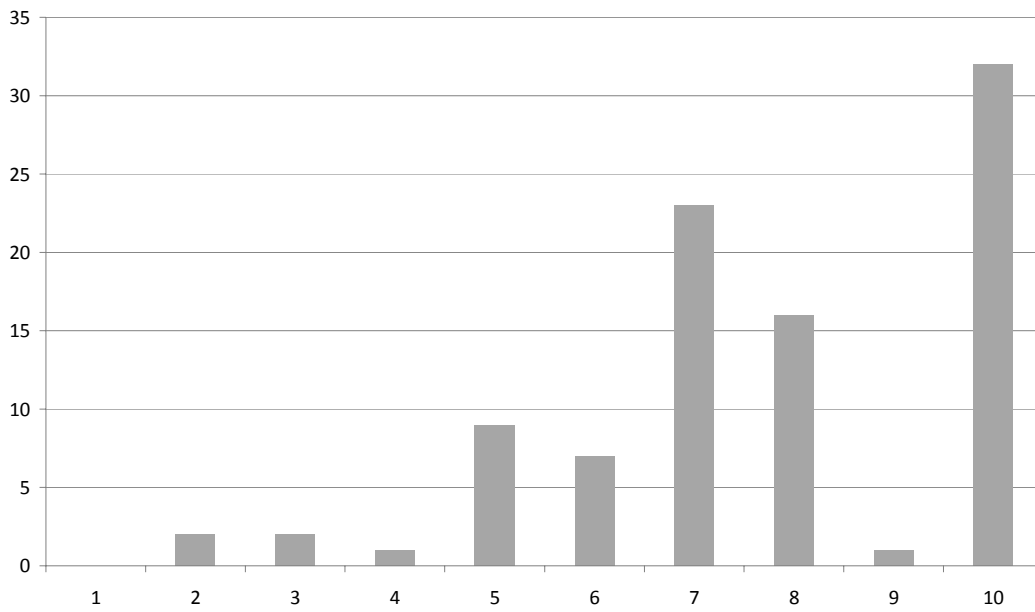


Fig. 7. Ranges of Soil (water) (R) acidity (pH) indicator value.

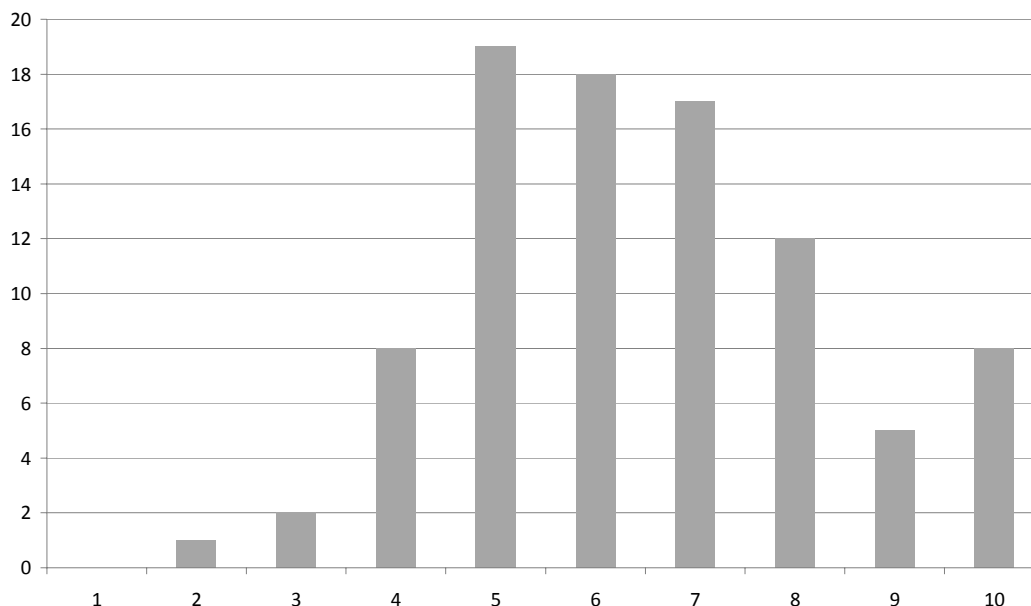


Fig. 8. Ranges of Nitrogen (N) indicator value.

## DISCUSSION AND CONCLUSION

The problem of dying out archeophytes has been for a long time observed in Poland and in Europe (ŽUKOWSKI & JACKOWIAK, 1995, WARCHOLIŃSKA, 1994, SCHNEIDER et al., 1994, KORNAŚ & MEDWECKA-KORNAŚ, 2002). In Cedyński Landscape Park over 16% of species are extinct or lost. Among them are taxa attached both to segetal habitats of a high content of calcium carbonate (for example *Adonis aestivalis*) as well as to ruderal ones (for example *Atriplex nitens*). The last single records of most of these species come from early '90-ties (CIACIURA & ZIARNEK, 1994), however, the sites of a part of them vanished much earlier. The phenomenon of the decline of archeophytes is brought about by the traditional agriculture changing into the intensive production associated with mechanization; application of large amounts of herbicides; use of well purified sowing materials and intensive mineral fertilization. The impoverishment of the ruderal flora is due to the disappearance of habitats with a rich content of nitrogen in the neighbourhood of homesteads since greater case is paid to the aesthetics of houses in villages. The recession process of archeophytes can continue. As many as 39.1% of archeophytes are rare or very rare species in the Park area. They most frequently occur on roadsides, arable land, at the homesteads and fences. Some species were only found in semi-natural habitats, however, these were only single records, such as *Geranium dissectum*, *Nepeta cataria*, *Odontites verna*.

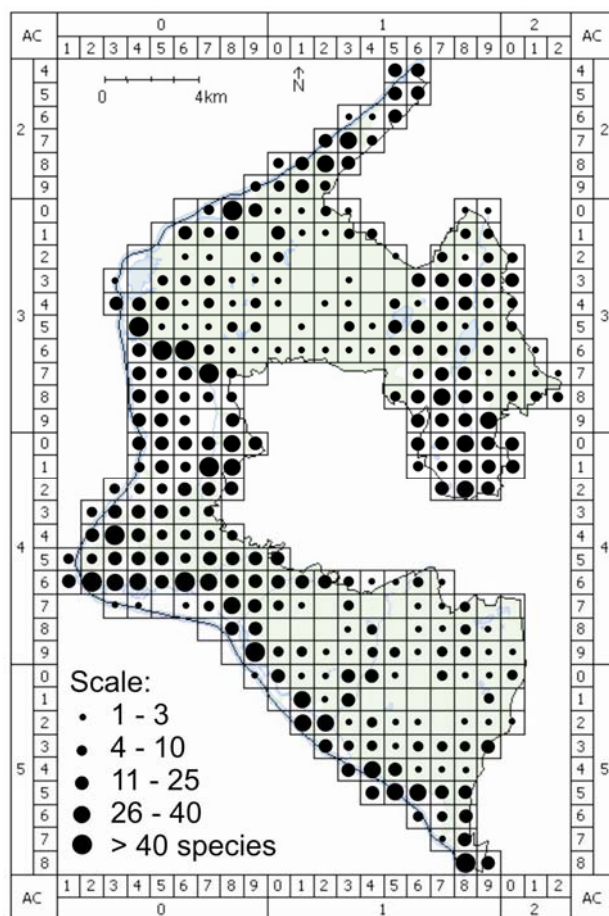


Fig. 9. Distribution of some archaeophytes in Cedyński Landscape Park (Poland).

Many archeophytes are still numerously represented in the flora of the Park, 16.2% of them being very frequent and common species. In the group of most common species in the Park area the highest number of recorded archeophytes was found on the roadsides; lower numbers being noted on fallows, fields, at the homesteads and by fences. In the Park the dense net of roads favours the spreading of species which are particularly well adapted to this kind of habitats. The two groups of species, extreme with respect to the degree of distribution, prefer similar habitats of anthropogenic character in agreement with the general preferences of archeophytes. It is striking that of 34 archeophytes rarely and very rarely occurring in the Cedynia Landscape Park nine species only were noted on xerothermal grasslands, meadows and pastures which are characterized with a great abundance of archeophytes. The very frequent and common species of the Park, except for *Fallopia convolvulus* and *Cirsium vulgare*, are characterized by the low indicator of naturalization *Inat* but still they all were recorded on semi-natural or even natural habitats (*Fallopia convolvulus*, *Ballota nigra*, *Melandrium album*, *Lactuca seriola*).

In spite of the fact that most archeophytes belong to species for such a long time domesticated in the flora of Poland, their naturalization index  $I_{nat}$  is low. The immigrated species surviving in this area or originating owing to man are chiefly attached to ruderal and segetal habitats. Six species only were most frequently recorded in semi-natural habitats. However, chiefly due to the number of records in the CLP only *Carduus nutans* and *Camelina microcarpa* subsp. *sylvestris* can be regarded as the permanently domesticated in semi-natural habitats – chiefly xerothermal sods. For the remaining four species single records were only made in this type of habitats.

In semi-natural and natural habitats the total number of 69 species of archeophytes was recorded. Among them a high number of records was made for *Fallopia convolvulus*. In Poland this species is mainly connected with synanthropic habitats, sporadically occurring also on neighbouring xerothermal grasslands (ZAJĄC, 1979). In the Park area almost equally often as on synanthropic habitats *Fallopia convolvulus* occurs on semi-natural habitats, most frequently in forest ecosystems. This species is chiefly found in pine stands, however, sometimes it even enters forest communities of natural character. Two large forest complexes of the Park, neighbouring on vast agricultural areas, are cut with a road nets which facilitate the penetration of this species into forest ecosystems. No other archeophyte penetrated forest habitats to such a high degree in spite of the total number of 34 species being found here. However, this is not an isolated case since in the area of the River Główna catchment this species was also recognized as expansive in forest ecosystems (RATYŃSKA, 2003). *Melandrium album*, probably also an archeophyte (ZAJĄC et al., 1998), should be mentioned here as the species penetrating forests, sods and meadows in CLP and also *Lamium purpureum*, the species encroaching grassland and forest (mainly deciduous forests) ecosystems through the road net where it is numerously recorded.

Of semi-natural and natural ecosystems xerothermal grasslands are characterized by the most abundant occurrence of archeophytes (51 species of archeophytes) with the highest number of records of *Anchusa officinalis*, *Bromus sterilis*, *Melandrium album*, *Papaver dubium*. Many sites of xerothermal and sandy grassland are found in the Park. They frequently neighbour on segetal and ruderal (such as road sites) communities. The specificity of these sites and the neighbourhood of communities of anthropogenic character facilitates the penetration and maintenance of alien species, both archeophytes and xenophytes.

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