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Anthropophytes permanently established in the flora of the Rybnik Plateau (South Poland)

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Abstract: In the investigated area totally 1200 permanently established vascular plants species (including 952 indigenous and 248 anthropophytes) were collected (URBISZ 1996). Full list of archaeophytes (species introduced to Europe before the discovery of America) and kenophytes (=newcomers, =neophytes) noted in this region and essential differences between these two groups of alien species were presented. It was stated that archaeophytes occuring mostly in segetal and ruderal areas and very seldom in semi-natural habitats – in this group number of species will not change too much. Instead, many of kenophytes are found in natural or semi-natural habitats. Species from this group often substituting natural elements of the flora and its number constantly increases.

Keywords: alien plants, archaeophytes, kenophytes, the Rybnik Plateau, the Silesian Upland, Poland.

Introduction

Anthropophytes (alien species) occurring in the flora of Poland have been the interest of many authors (FALIŃSKI 1968, 1969; JACKOWIAK 1990; KORNAŚ 1968A, 1968B, 1971, 1981; KRAWIECOWA A. 1951; KRAWIECOWA & ROSTAŃSKI 1972, 1976; ŁAWRYNOWICZ & WARCHOLIŃSKA 1992; MIREK 1981; ROSTAŃSKI & SOWA 1987: TRZCIŃSKA-TACIK 1979; URBISZ 1994; ZAJĄC et al. 1998). There are many classification systems of these species on the account of their reaction to human activity (SUDNIK-WÓJCIKOWSKA & KOŹNIEWSKA 1979). In Poland classification made by KORNAŚ (1981) and by TRZCIŃSKA-TACIK (1979) is commonly being

used. They divided alien species into two groups: metaphytes (permanently established in the territory of Poland) and diaphytes (temporarily established or escaped from cultivation). The present paper concerns the former group, and its aim is to characterize species belonging to it in the area of the Rybnik Plateau.

Study area

The Rybnik Plateau is a region situated in southern part of Poland. It covers south–western area of the Silesian Upland about 960 km^2 (KONDRACKI 1988) and takes up main part of the Rybnik Coal District (ROW). Its borders from east and partly from south are marked by heads of Pszczynka river and its tributaries, from south Olza valley, from west Odra valley, and from north the Kozielska Basin and the Katowice Upland. It is rolling region; average altitude is 260-280 m. a.s.l. Its north-eastern part is more sandy and level, whereas south-western part, Rybnickie Hills so called, reached nearby of Pszów, Rydułtowy and Niewiadom 300 meters above sea-level and slope steeply towards Odra valley forming numerous ravines. Besides natural forms of land surface, on the Rybnik Plateau there are so called anthropogenic forms, which came arise as a result of human impact (for example: flood areas, mining subsidence areas, sandpits, gravel-pits, clay-pits and conical industrial waste tips and flat ones). The Rybnik Plateau is situated on main watershed of headstreams of Odra and Vistula, however, its much more bigger part belongs to river basin of Odra. There are also many ponds basically in the neighborhood of Rybnik, Żory, Lyski and Pawłowice.

Material and methods

The floristic studies were conducted between 1986 and 1995 with the use of cartogramme method. The study area was divided according to the grid of square of the "Distribution Atlas of Vascular Plants in Poland" - ATPOL (ZAJĄC 1978). The essential research fields were square units 2 x 2 kilometre (total 240). The species names follow "Flowering plants and pteridophytes of Poland - a Checklist" (MIREK et al. 2002). For particular species information concerning their origin (ZAJĄC 1979, ZAJĄC et al. 1998), life form (ZARZYCKI et al. 2002) and the number of sites were included.

Results

Permanently established alien species (metaphytes) are divided into two groups: introduced to Poland before discovering America (archaeophytes) and those, which appeared after this historical event (kenophytes). Full list of archaeophytes (Tab. 1) and kenophytes (Tab. 2) observed in the Rybnik Plateau were shown. In this region 112 archaeophytes (about 70% all species from this group in flora of Poland) and 136 kenophytes (about 50%) were noticed.

Participations of life forms within these two groups of plants were shown in figure 1. Archaeophytes are mostly therophytes, whereas among kenophytes there are a lot of hemicryptophytes and phanerophytes.

Most archeophytes are of European and of Euro-Asiatic origin (Fig. 2). As far as kenophytes are concerned they are much various with this regard, as 41% species belonging to this group are of American origin.

Within both the analyzed groups of anthropophytes one can find species which have not been found for a long time in the investigated area. Of 21 not confirmed archaeophytes 9 species were not observed after 1945 (*Chenopodium urbicum* L., *Euphorbia falcata* L., *Herniaria hirsuta* L., *Kickxia elatine* (L.) DUMORT, *Linaria arvensis* (L.) DESF., *Misopates orontium* (L.) RAF., *Polycnemum arvense* L., *Setaria verticillata* (L.) P. BEAUV, *Silene gallica* L.), instead among 14 not found kenophytes there are only 3 such species – *Inula helenium* L., *Mimulus guttatus* DC. and *Xanthium spinosum* L. as well.

Discussion

In this connection that in ancient times there was no chance for arrival of north-American or Australian species to Poland, they are not present in the group of archaeophytes. Because most of towns then there were in Mediterranean Sea basin, most of species came from there. It is inversely in the case of kenophytes - among them there are a lot of American species.

Archaeophytes are mainly weeds or unwished species for human (for example: *Apera spica venti* (L.) P. BEAUV., *Echinochloa crus galli* (L.) P. BEAUV., *Fallopia convolvulus* (L.) Á. LÖVE, *Matricaria maritima* subsp *inodora* (L.) DOSTÁL, *Setaria pumila* (POIR.) ROEM. ET SCHULT., *Viola arvensis* MURRAY), who tries to limit their numbers in different ways, however, among kenophytes there are many species introduced on purpose like: *Acer negundo* L., *Aesculus hippocastanum* L., *Aster novi-belgi* L., *Fraxinus pensylvanica* MARSHALL., *Helanthus tuberosus* L., *Impatiens glandulifera* ROYLE, *Padus serotina* (EHRH.) BORKH., *Parthenocissus inserta* (A. KERN.) FRITSCH, *Quercus rubra* L., *Rosa rugosa* THUNB., *Rudbeckia laciniata* L., *Symphoricarpos albus* (L.) S. F. BLAKE, *Tanacetum parthenium* (L.) SCH. BIP. and the others.

Altought in the study area there are many very frequent and common archaeophytes (e.g.: *Apera spica-venti, Capsella bursa-pastoris* (L.) MEDIK., *Fallopia convolvulus, Lactuca serriola* L., *Lamium purpureum* L., *Matricaria maritima* subsp. *inodora, Sisymbrium officinale* (L.) Scop., *Sonchus oleraceus* L., *Viola arvensis*), they are mostly connected with segetal or ruderal habitats. In cintradistinction to the former group, kenophytes are capable to penetrate and establish in natural and semi-natural habitats. At the present they are common or frequent there, despite the fact that tens years ago they occurred rarely in the study area (e.g.: *Bidens frondosa* L., *Bromus carinatus* HOOK. ET ARN., *Echinocystis lobata* (F. MICHX.) TORR. ET A. GRAY, *Epilobium ciliatum* RAF., *Impatiens glandulifera, I. parviflora* DC., *Juncus tenuis* WILLD., *Oxalis fontana* BUNGE, *Padus serotina, Quercus rubra, Reynoutria japonica* HOUTT., *Solidago*

canadensis L., *S. gigantea* AITON and the others). Species included to kenophytes often may have different status in the flora of our country. In some regions they are permanently established and on the other hand they can not exist for a long time in other regions. It considerably depends on physiographical conditions and also on intensity of human activity which makes possible bigger influx of diaspores of these species from outside.

Another trait of kenophyes which differentiates them from archaeophytes is a wide spectrum of life forms within this group of plants. Archaeophytes, as short-lived (therophytes) and photophilous species, occur basically in man-made fields with small vegetation cover and therefore they can not penetrate natural and semi-natural habitats. Otherwise is in the case of kenophytes, among which there are many long-termed species, trees, shrubs as well, which owing to man compete with native species, naturalizing in natural habitats like for example: *Impatiens parviflora* in forests or *Acorus calamus* L. along banks of waters.

Based on the comparison of these two groups of species one can draw a conclusion that amongst kenophytes there are many invasive plants expanding their range, whereas archaeophytes are group, to which apart from common species, some extinct and endangered species belong. The essential cause of that phenomenon is the fact that archaeophytes are "closed" group because its number can not grow considerably anymore (some species classified as natives or kenophytes, seldom turn out to be archaeophytes). Additionally, some of arachaeophytes may be indigenous species and in this connection their number might be smaller. In contradistinction to archaeophytes, kenophytes are "open" group – their number increases permanently (development of international transport and communication lead to increase of influx of alien species, from which part of them become permanent elements of Polish flora). Whereas the small number of localities of archaeophytes mainly signifies the decrease of species range, the same number of sites of kenophytes species often reveals initial stadium of its expansion.

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Tab. 1. Archaeophytes of the Rybnik Plateau.

Species name	L.f.	Origin	Ref.	Aut.
Adonis aestivalis L.	T.	E.AZ.	1	-
Agrostemma githago L.	T.	E.		10
Anagallis arvensis L.	T.	AZ.AF.		20
Anagallis foemina MILL.	T.	E.	1	-
Anchusa officinalis L.	H.	E.AZ.	2	-
Anthemis arvensis L.	T.	E.		36
Anthemis cotula L.	T.	E.		5
Apera spica-venti (L.) BEAUV.	T.	?		201
Aphanes arvensis L.	T.	E.		2
Armoracia rusticana P. GAERTN., B. MEY ET SCHR.	G.	E.		150
Atriplex nitens SCHKUHR	T.	AZ.		7
Avena fatua L.	T.	AZ.		29
Avena strigosa SCHREB.	T.	ANT.		26
Ballota nigra L.	C. H.	E.		47
Berteroa incana (L.) DC.	H. T.	?		22
Bromus secalinus L.	T.	ANT.		22
Bromus sterilis L.	T.	E.AZ.		19
Bromus tectorum L.	T.	E.AZ.		35
Camelina microcarpa ANDRZ.	T.	AZ.		1
Capsella bursa-pastoris (L.) MEDIK.	T.	E.		237
Carduus acanthoides L.	H.	E.		13
Centaurea cyanus L.	T.	E.		188
Chamomilla recutita (L.) RAUSCHERT	T.	E.		143
Chenopodium bonus-henricus L.	C.	E.		6
Chenopodium ficifolium SM.	T.	AZ.		17
Chenopodium hybridum L.	T.	ANT.		8
Chenopodium urbicum L.	T.	E.AZ.	+2	-
Cichorium intybus L.	H.	E.AZ.		80
Cirsium vulgare (SAVI) TEN.	H.	?		219
Conium maculatum L.	H. T.	E.AZ.		3
Consolida regalis S. F. GRAY	T.	E.AZ.		3
Descurainia sophia (L.) WEBB EX PRANTL	T.	AZ.		34
Digitaria ischaemum (SCHREB.) H. L. MÜHL	T.	?		23
Digitaria sanguinalis (L.) SCOP.	T.	AZ.		14
Echinochloa crus-galli (L.) P. BEAUV.	T.	AZ.		166
Erysimum cheiranthoides L.	T.	E.AZ.		142
Euphorbia exigua L.	T.	E.	1	-
Euphorbia falcata L.	T.	E.AZ.	+1	-
Euphorbia helioscopia L	T.	E.		43
Euphorbia peplus L.	T.	E.		50
Euphorbia platyphyllos L.	T.	E.AZ.	1	1
Fallopia convolvulus (L.) Á. LÖVE	T. I.	?		202
Fumaria officinalis L.	T.	E.		2
Galeopsis ladanum L.	T.	E.		7
Galium spurium L.	T. I.	ANT.		1
Geranium columbinum L.	T.	E.		2
Geranium dissectum L.	T.	E.		13
Geranium molle L.	T.	E.		3

Geranium pusillum BURM. F. EX. L.	T.	AZ.		126
Herniaria hirsuta L.	H.	E.AZ.	+6	-
Hordeum murinum L.	T.	E.AZ.		9
Hyoscyamus niger L.	H. T.	AZ.	1	-
Kickxia elatine (L.) DUMORT.	T.	E.	+2	-
Lactuca serriola L.	H. T.	E.AZ.		191
Lamium album L.	H.	E.AZ.		20
Lamium amplexicaule L.	T.	E.AZ.		20
Lamium moluccellifolium FR.	T.	ANT.		1
Lamium purpureum L.	H. T.	E.		203
Lathyrus tuberosus L.	H.	E.AZ.		6
Leonurus cardiaca L.	H.	E.AZ.		18
Lepidium campestre (L.) R. BR.	T.	E.		10
Lepidium ruderale L.	H. T.	AZ.		51
Linaria arvensis (L.) DESF.	T.	E.	+1	-
Lithospermum arvense L.	T.	E.AZ.		31
Lolium remotum SCHRANK	T.	ANT.	1	-
Lolium temulentum L.	T.	E.	1	-
Malva neglecta WALLR.	H. T.	AZ.		78
Malva pusilla SM.	H. T.	ANT.	4	-
Malva sylvestris L.	H. T.	E.		45
Matricaria maritima L. subsp. *inodora* L. DOSTÁL	H. T.	ANT.		235
Melandrium album (MILL.) GARCKE	T.	?		210
Melandrium noctiflorum (L.) FR.	T.	E.AZ.	3	-
Misopates orontium (L.) RAF.	T.	E.	+1	-
Myosotis arvensis (L.) HILL	H. T.	E.AZ.		136
Nepeta cataria L.	C. H.	E.AZ.		12
Neslia paniculata (L.) DESV.	T.	ANT.	3	-
Nigella arvensis L.	T.	E.		1
Odontites verna (BELLARDI) DUMORT.	T. pp.	ANT.		7
Onopordum acanthium L.	H.	E.AZ.		42
Papaver argemone L.	T.	E.AZ.		8
Papaver dubium L.	T.	E.AZ.		14
Papaver rhoeas L.	T.	E.AZ.		92
Pisum sativum L. subsp. *arvense* (L.) ASCH. ET GR.	T.	E.AZ.		3
Polycnemum arvense L.	T.	E.AZ.	+2	-
Ranunculus arvensis L.	T.	E.AZ.	1	-
Raphanus raphanistrum L.	T.	E.		187
Scleranthus annuus L.	T.	E.		90
Senecio vulgaris L.	H. T.	E.		148
Setaria italica (L.) P. BEAUV.	T.	E.AZ.		1
Setaria pumila (POIR.) ROEM. ET SCHULT.	T.	AZ.		109
Setaria verticillata (L.) P. BEAUV.	T.	AZ.	+1	-
Setaria viridis (L.) BEAUV.	T.	E.AZ.		25
Sherardia arvensis L.	T.	E.		1
Silene gallica L.	T.	E.	+5	-
Sinapis arvensis L.	T.	E.		118
Sisymbrium officinale (L.) SCOP.	T.	E.		202
Solanum luteum MILL.	T.	E.		1
Solanum nigrum L. EM. MILL.	T.	?		16

Sonchus asper (L.) HILL	T.	E.		64
Sonchus oleraceus L.	H. T.	E.		190
Spergula arvensis L.	T.	E.		159
Thlaspi arvense L.	T.	AZ.		85
Urtica urens L.	T.	E.		45
Verbena officinalis L.	H. T.	E.AZ.		17
Veronica agrestis L.	T.	E.	1	-
Veronica arvensis L.	T.	E.		104
Veronica triphyllos L.	T.	ANT.		1
Vicia hirsuta (L.) S. F. GRAY	T. I.	E.		129
Vicia sativa L.	T. I.	ANT.		57
Vicia tetrasperma (L.) SCHREB.	T. I.	E.		80
Vicia villosa ROTH	H.T.I.	E.		32
Viola arvensis MURRAY	T.	?		217

Tab. 2. Kenophytes of the study area.

Species name	L.f.	Origin	Ken. g.	Ref	Aut.
Acer negundo L.	M.	AN.	He.		57
Acorus calamus L.	Hy.	AZ.	Ho.		17
Aesculus hippocastanum L.	M.	E.	He.		125
Amaranthus albus L.	T.	AN.	Ep.		11
Amaranthus chlorostachys WILLD.	T.	AN.AS.	Ep.		1
Amaranthus lividus L.	T.	E.AF.	Ep.		2
Amaranthus retroflexus L.	T.	AN.	Ep.		58
Amelanchier spicata G. N. JONES	N.	AN.	He.		6
Anaphalis margaritacea (L.) BENTH.	C.	AN.	Ep.	1	1
Anthemis ruthenica M. BIEB.	T.	E.	Ep.		5
Anthoxanthum aristatum BOISS.	T.	E.	Ep.		10
Asclepias syriaca L.	H.	AN.	Ep.		1
Aster lanceolatus WILLD.	H.	AN.	He.		3
Aster novae-angliae L.	H.	AN.	Ep.	1	-
Aster novi-belgii L.	H.	AN.	He.		42
Aster x salignus WILLD.	H.	AN.	He.		3
Atriplex hortensis L.	T.	AZ.	Ep.		48
Bidens connata H. L. MÜHL.	T.	AN.	Ho.		10
Bidens frondosa L.	T.	AN.	Ho.		152
Brassica rapa L.	T.	ANT.	Ep.		33
Bromus carinatus HOOK. ET ARN.	T.	AN.	Ep.		62
Bromus squarrosus L.	T.	E.AZ.	Ep.		1
Bryonia dioica JACQ.	G.H.I.	E.	Ep.		1
Bunias orientalis L.	H.	E.AZ.	Ep.		6
Calystegia sylvatica (KIT.) GRISEB.	G.H.I.	E.	He.		9
Cardaria draba (L.) DESV.	G. H.	E.AZ.	Ep.		6
Cerasus mahaleb (L.) MILL.	M.	E.AZ.	Ep.		1
Chamomilla suaveolens (PURSH) RYDB.	T.	AN.AZ.	Ep.		231
Chenopodium botrys L.	T.	AZ.	Ep.		1
Chenopodium strictum ROTH	T.	AZ.	Ep.		46
Chenopodium suecicum MURR	T.	AN.E.AZ.	Ep.	3	-
Clematis vitalba L.	N. I.	E.	Ep.		5
Conyza canadensis (L.) CRONQUIST	H. T.	AN.	He.		222
Corispermum leptopterum (ASCH.) ILJIN	T.	E.AZ.	Ep.		10
Cornus alba L.	N.	E.AZ.	Ep.		51
Crataegus pedicellata SARG.	M. N.	AN.	He.		9
Cuscuta campestris YUNCK.	T. p.	AN.	Ep.		2
Cymbalaria muralis P. GAERTN., B. MEY. ET SCHR.	C. H.	E.	Ep.	1	-
Datura stramonium L.	T.	AN.	Ep.	4	1
Dianthus barbatus L. s. s.	C.	E.	Ep.		13
Digitalis purpurea L.	H.	E.	He.		5
Diplotaxis muralis (L.) DC.	T.	E.	Ep.		6
Echinocystis lobata (F. MICHX.) TORR. ET A. GRAY	T. I.	AN.	He.		86
Echinops sphaerocephalus L.	H.	E.AZ.	Ep.		20
Elaeagnus commutata BERNH.	N.	AN.	Ep.		1
Elodea canadensis MICHX.	Hy.	AN.	Ho.		31
Elsholtzia ciliata (THUNB.) HYL.	T.	AZ.	Ep.	1	-

Epilobium ciliatum RAF.	H.	AN.	Ho.		132
Eragrostis minor HOST	T.	E.	Ep.		12
Erechtites hieraciifolia (L.) RAF. EX DC.	T.	AN.AS.	Ho.	3	1
Erigeron annuus (L.) PERS	H.	AN.	He.		57
Erigeron ramosus (WALT.) BRIT., STER. ET POGG.	H.	AN.	Ep.	1	1
Erucastrum gallicum (WILLD.) O. E. SCHULZ	H. T.	E.	Ep.	1	-
Erysimum marschallianum ANDRZ. EX M. BIEB.	H.	E.AZ.	Ep.		1
Fraxinus pennsylvanica MARSHALL	M.	AN.	He.		41
Galinsoga ciliata (RAF.) S. F. BLAKE	T.	AN.	Ep.		229
Galinsoga parviflora CAV.	T.	AN.AS.	Ep.		181
Helianthus tuberosus L.	G.	AN.	He.		30
Heracleum sosnovskii MANDEN.	H.	AZ.	He.		7
Hesperis matronalis L.	H.	E.	Ep.		6
Hordeum jubatum L.	T.	AS.	Ep.		3
Impatiens glandulifera ROYLE	T.	AZ.	He.		43
Impatiens parviflora DC.	T.	AZ.	Ho.		182
Inula helenium L.	H.	E.AZ.	He.	+2	-
Iva xanthiifolia NUTT.	T.	AN.	Ep.		1
Juglans regia L.	M.	E.AZ.	Ep.		88
Juncus tenuis WILLD.	H.	AN.	Ho.		112
Kochia scoparia (L.) SCHRAD.	T.	E.AZ.	Ep.		29
Lepidium densiflorum SCHRAD.	H. T.	AN.	Ep.		2
Lepidium virginicum L.	T.	AN.	Ep.		9
Lolium multiflorum LAM.	H. T.	E.AF.AZ.	Ep.		53
Lonicera caprifolium L.	N. I.	E.	Ep.		1
Lonicera tatarica L.	N.	AZ.	Ep.		10
Lupinus polyphyllus LINDL.	H.	AN.	He.		148
Lycium barbarum L.	N.	AZ.	Ep.		4
Lycopersicon esculentum MILL.	T.	AS.	Ep.		33
Malva alcea L.	H.	E.	Ep.		37
Malva moschata L.	H.	E.	Ep.		3
Medicago sativa L.	C. H.	AZ.	He.		167
Medicago x varia MARTYN	H.	ANT.	He.		1
Mentha rotundifolia (L.) HUDS	H.	E.	Ep.		3
Mentha spicata L. em. L.	H.	ANT.	Ep.		5
Mercurialis annua L.	T.	E.	Ep.		1
Mimulus guttatus DC.	H.Hy.	AN.	He.	+1	-
Oenothera acutifolia ROSTAŃSKI	H.	ANT.	Ep.	1	1
Oenothera canovirens E. S. STEELE	H.	AN.	Ep.	3	-
Oenothera glazioviana MICHELI IN MART.	H.	AN.	Ep.		1
Oenothera paradoxa HUDZIOK	H.	ANT.	Ep.		4
Oenothera pseudochicaginensis ROSTAŃSKI	H.	ANT.	Ep.		2
Oenothera pycnocarpa ATK. ET BARTL. IN BARTL.	H.	AN.	Ep.		1
Oenothera royfraseri R. R. GATES	H.	AN.	Ep.		2
Oenothera salicifolia DESF. EX G. DON	H.	AN.	Ep.	4	-
Oenothera subterminalis R. R. GATES	H.	AN.	Ep.	5	6
Oenothera wienii RENNER EX ROSTAŃSKI	H.	ANT.	Ep.	1	-
Onobrychis viciifolia SCOP.	H.	E.	Ho.		1
Oxalis corniculata L.	T.	E.	Ep.	2	-
Oxalis fontana Bunge	G.	AN.AZ.	Ho.		130

Padus serotina (EHRH.) BORKH.	M.	AN.AS.	Ho.		107
Parthenocissus inserta (A. KERN.) FRITSCH	N. l.	AN.	He.		44
Physalis alkekengi L.	H.	E.AZ.	Ep.		3
Populus x canadensis MOENCH	M.	AN.	He.		116
Populus 'NE 42'	M.	AZ.	He.		123
Portulaca oleracea L.	T.	AZ.AF.	Ep.		1
Potentilla intermedia L. NON WAHLENB.	H.	E.AZ.	Ep.		4
Prunus cerasifera EHRH.	M.	E.AZ.	He.		5
Quercus rubra L.	M.	AN.	Ho.		163
Reynoutria japonica HOUTT.	G.	AZ.	He.		111
Reynoutria sachalinensis (F. SCHMIDT) NAKAI	G.	AZ.	He.		13
Robinia pseudoacacia L.	M.	AN.	He.		199
Rosa multiflora THUNB.	N.	AZ.	Ep.		17
Rosa rugosa THUNB.	N.	AZ.	He.		74
Rubus armeniacus FOCKE	N.	AZ.	He.	1	-
Rubus odoratus L.	N.	AN.	He.	1	-
Rudbeckia laciniata L.	H.	AN.	He.		44
Rumex confertus WILLD.	H.	E.AZ.	Ep.		1
Rumex longifolius DC.	H.	E.	He.		6
Salix acutifolia WILLD.	N.	E.AZ.	Ep.		8
Salsola kali L. subsp. *ruthenica* (ILJIN) SOÓ	T.	E.AZ.	Ep.		1
Sedum spurium M. BIEB.	C.	AZ.	Ep.		15
Senecio vernalis WALDST. ET KIT.	H. T.	E.AZ.	He.		10
Sinapis alba L.	T.	E.	Ep.		9
Sisymbrium altissimum L.	H. T.	E.AZ.	Ep.		26
Sisymbrium loeselii L.	H. T.	E.AZ.	Ep.		20
Solidago canadensis L.	G. H.	AN.	He.		130
Solidago gigantea AITON	G. H.	AN.	He.		213
Solidago graminifolia (L.) ELLIOTT	G. H.	AN.	He.		4
Sorbaria sorbifolia (L.) A. BRAUN	N.	AZ.	He.		18
Spiraea x pseudosalicifolia SILVERSIDE	N.	ANT.	He.		45
Symphoricarpos albus (L.) S. F BLAKE	N.	AN.	He.		118
Syringa vulgaris L.	N.	E.	Ep.		164
Tanacetum parthenium (L.) SCH. BIP.	H.	E.AZ.	Ep.		32
Veronica persica POIR.	T.	AZ.	Ep.		64
Vicia dasycarpa TEN.	H.T.I.	E.	Ep.		54
Vicia grandiflora SCOP.	T. I.	E.AZ.	Ep.		2
Viola odorata L.	H.	E.	He.		17
Xanthium spinosum L.	T.	AS.	Ep.	+1	-

Explanations to Table 1 and 2:

L.f. (life forms): M. – megaphanerophytes, N. – nanophanerophytes, Ch. – chamaephytes, C. – herbaceous chamaephytes, H. – hemicryptophytes, G. – geophytes, Hy. – hydrophytes, T. – therophytes, l. – lianas, p. – parasites, pp. – semi-parasites.

Origin: AF. – Africa, AN. – North America, ANT. – anthropogenic taxon, AS. – South America, AZ. – Asia, E. – Europe, ? – unknown.

Ken.g. (kenophytes groups): Ep. – epoecophytes (species established in man-made habitats), He. – hemiagriophytes (species established in man-made and semi-natural habitats), Ho. – holoagriophytes (species established in man-made, semi-natural and natural habitats).

Ref. – number of localities from literature

Aut. – number of confirmed localities by the author

+ - localities not confirmed after 1945

Fig.1. Life forms (see explanations to Table 1 and 2).

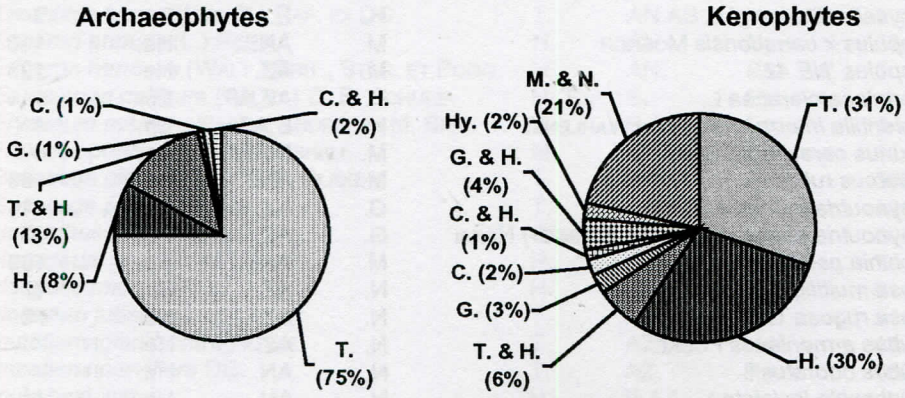

Fig.2. Origin (ANT. = anthropogenic taxon).