Thaiszia - J. Bot., Košice, 15, Suppl. 1: 53-69, 2005
http://www.upjs.sk/bz/thaiszia/index.html

THAISZIA
JOURNAL OF
BOTANY

Archaeophytes in Ukraine: the present patterns of distribution and degree of naturalization

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PROTOPOPOVA V., SHEVERA M. (2005): Archaeophytes in Ukraine: the present patterns of distribution and degree of naturalization. – Thaiszia – J. Bot. 15, Suppl. 1: 53-69. – ISSN 1210-0420.

Abstract: Results of a study of archeophytes of the Ukrainian flora are presented. According to our data, archaeophytes, as well as kenophytes, are characterized by different degrees of naturalization. The archaeophyte fraction of the Ukrainian flora is represented by 157 species, incl. agriophytes - 4, epoecophytes - 109, agrio-epoecophytes - 21, ergasiophytes – 4, and ephemerophytes - 19.

Keywords: Archaeophytes, agriophytes, epoecophytes, agrio-epoecophytes, ergasiophytes, ephemerophytes, Ukrainian flora.

Introduction

Investigation of archaeophytes is very important for ascertaining the issues concerning the history of the flora and modern tendencies of its development, as well for studies of adaptive capacities of alien (adventive) species.

Studies of the role of archaeophytes in the plant cover are important and interesting for elucidating the dynamic patterns in the alien flora. Archaeophytes naturalized in the native flora centuries ago are evidently more adapted to local conditions; because of that, they are often viewed as species so well incorporated in the local flora that their alien status is often questioned. However, their ranges are changing even now, and by their degree of naturalization these species represent a non-uniform group of taxa with different trends of distribution and expansion. Because of that we believe that any analysis of naturalization of archaeophytes should be performed using the same criteria and categories as those used at analyzing kenophytes. In the present article, we

consider changes in distribution patterns and naturalization of archaeophytes in the flora of Ukraine during the last century.

Results

The flora of Ukraine (including native, alien, introduced and escaped, and most commonly cultivated taxa) is represented by ca. 6000 species of vascular plants (Mosyakin, Fedoronchuk, 1999). The alien fraction of the flora is represented by at least 830 species of vascular plants, or 14 % of the total number of species in the vascular flora (Protopopova, Mosyakin, Shevera, 2002), including 157 species of archaeophytes belonging to 104 genera and 33 families, incl. agriophytes - 4, epoecophytes - 109, agrio-epoecophytes - 21, ergasiophytes – 4, and ephemerophytes – 19 (Fig. 1.). The annual, xeromesophytes and species of the Mediterranean (52) and Mediterranean-Irano-Turanian (32) origin prevail in ecological and geographical spectrums (Protopopova, 1991).

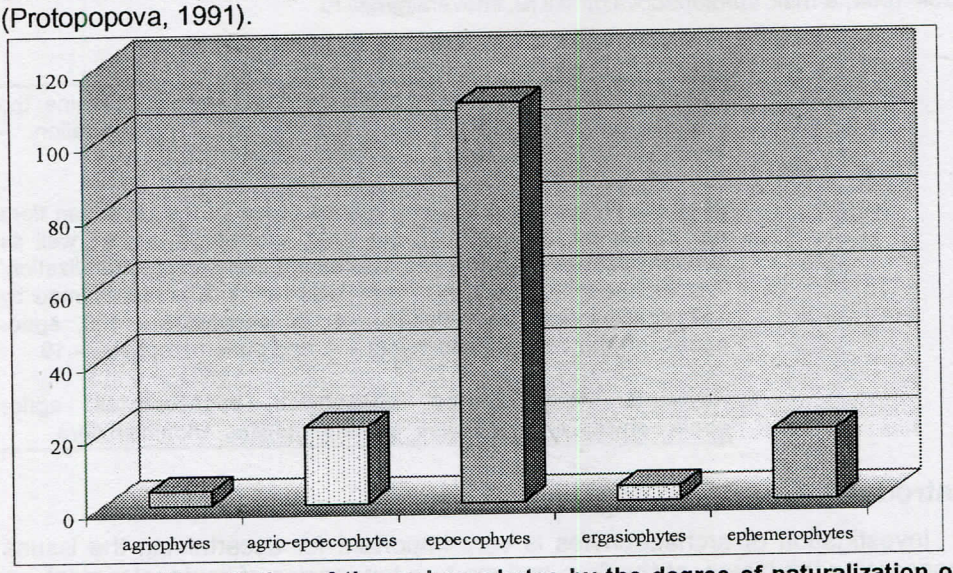

Fig. 1. The differentiation of the archaeophytes by the degree of naturalization on the territory of Ukraine.

The modern distribution of archaeophytes of the Ukrainian flora in the different botanical-geographical zones and regions of Ukraine is presented in Table 1.

The analysis of modern distribution patterns of archaeophytes in different biogeographic regions of Ukraine shows the following spectrum: 111 species grow in Crimea, 117 species in the Steppe zone, 130 species in the Forest-steppe, 118 species in Roztochchya-Opillya, 120 species in Polissya, and 124 species in the Carpathians.

Among archaeophytes of the flora of Ukraine, only four species (*Acorus calamus*, *Artemisia abrotanum*, *Althea officinalis* and *Salix fragilis)* are agriophytes, i.e. the taxa incorporated in the structure of natural plant communities (mainly coastal ecotopes and floodplain forests). Twenty-one species (for example, *Anisantha sterilis*, *Anisantha tectorum*, *Apera spica-venti*, *Artemisia absinthium*, *Cichorium intybus*, *Lathyrus tuberosus*, *Vicia villosa*, etc.) display the tendency to widening of their ecotope spectrum on the expense of semi-natural habitats; we placed these species in the group of agrio-epoecophytes. The overwhelming majority of species (109 sp.) naturalized in anthropogenic habitats. They belong to the group of epoecophytes. The group of ephemerophytes comprises 18 species (for example, *Adonis aestivalis*, *A. flammea*, *Agrostemma githago*, *Camelina microcarpa*, *Chrysanthemum segetum*, *Persicaria linicola*, etc.), ergasiophytes are represented by 4 species (*Camelina sativa*, *Secale cereale*, *Reseda luteola*, *Sinapis alba*).

During the last century the following tendencies can be outlined in the dynamics of habitats of archaeophytes in the flora of Ukraine. Distribution of most species in Ukraine has not changed or has changed insignificantly. The group of species of archaeophytes with a conservative type of habitats is most numerous and comprises 115 species. Among them, 40 species occur in all biogeographical regions of Ukraine; almost all of them have naturalized on the lands transformed by man and are ruderal or segetal weeds. Twenty-six species are rare and occur in single or a few colonies. Among them, the majority of species are known from several locations. They are mainly weeds of fields and ruderal ecotopes, and only 4 species (*Gagea pratensis* in Mukachevo, Transcarpathia, *Alopecurus myosuroides* in towns of the Right-bank and Left-bank Forest-steppe zone, *Crepis capilaris* in the Carpathians and Roztochchya-Opillya, and *Ajuga chamaepytis* in Volyn') sometimes occur within seminatural communities.

The next group of archaeophytes consists of 32 species with a high invasive capability. Epoecophytes prevail among them. They have completely naturalized on the anthropogenic-transformed grounds and display the tendency to condensation of the habitat on segetal and ruderal ecotopes (*Artemisia absinthium, Brassica campestris, Conium maculatum, Carduus acanthoides, Descurania sophia, Malva neglecta, Malva pusilla, Papaver rhoeas, Raphanus raphanistrum, Sonchus oleraceus, Tripleurospermum inodorum,* etc.). There are 12 most aggressive species of the group, for example *Anisantha tectorum*, *Ballota nigra*, *Capsella bursa-pastoris*, *Echinochloa crusgalli*, *Lactuca serriola, Portulaca oleracea*, *Setaria glauca*, etc., which actively expand in the different type of ecotopes, as a well as anthropogenic, seminatural, and natural habitats (Tab. 2).

The third group of archaeophytes comprises species with the tendency to abrupt reduction of distribution (Table 3). Most of them are agricultural weeds: *Agrostema githago, Avena cultiformis*, *Avena fatua*, *Avena strigosa*, *Cuscuta epilinum*, *Persicaria linicola*. Their decline or disappearance is probably caused by improvement of agricultural techniques. *Xanthium strumarium* seems to be

overcompeted by more competitive species *X. albinum.* The similar situation, probably, occurs with *Marrubium vulgare*, as *M. praecox* occupies its habitats. *Urtica urens* since recently occurs in Ukraine very rarely, in small groups or single specimens. The location of *Gagea villosa* at present requires confirmation.

Conclusion

The results of our investigation demonstrate the following:

1. The geographical distribution and type of habitats of archaeophytes of Ukraine is indicative about non-heterogeneity of degree of naturalization of the species of this group.
2. The archaeophytes of the Ukrainian flora are presented by 157 species, incl. agriophytes - 4, epoecophytes - 109, agrio-epoecophytes - 21, ergasiophytes – 4, and ephemerophytes - 19.
3. The annual, xeromesophytes and species of the Mediterraneum (52) and Mediterranean-Irano-Turanian (32) origin prevail in ecological and geographical spectrums of archaeophytes of Ukraine.
4. According to the activity of distribution all archaeophytes of the Ukrainian flora can be divided into three groups: the species with regressive (9 sp.), active (32 sp., incl. 13 highly invasive) and conservative (115 sp.) range types.

Acknowledgement

We would like to thank Mgr. Olga Korniyenko and Dr. Sergej Mosyakin (M.G. Kholodny Institute of Botany, National Academy of Sciences of Ukraine, Kyiv) for translation and correction of the text.

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Tab. 1. Distribution of archaeophytes of the Ukrainian flora in different botanical-geographical zones and regions of Ukraine.

Family and species	Botanical-geographical zones and regions of Ukraine and status of species naturalization						
	Carp.	Rozt.-Opil.	Polissya	L.& R. Forest-Steppe region of Ukraine	L.& R. Steppe region of Ukraine	Crimea	Modern degree of naturalisation
Liliopsida							
Acoraceae							
Acorus calamus L.	+	+	+	+	+		Agr.
Liliaceae							
Gagea pratensis (Pers.) Dumort.	+						Ephem.
Gagea villosa (M. Bieb.) Duby	+			+	+		Ephem.
Poaceae							
Alopecurus myosuroides Huds.				+		+/Nat.	Ephem.
Anisantha sterilis (L.) Nevski	+	+		+	+	+	Agr.-epoec.
Anisantha tectorum (L.) Nevski	+	+	+	+	+	+	Agr.-epoec.
Apera spica-venti (L.) P. Beauv.	+	+	+	+	+	+	Agr.-epoec.
Avena cultiformis (Malzev) Malzev				+			Ephem.
Avena fatua L.	+	+	+	+	+	+	Ephem.
Avena strigosa Schreb.			+				Ephem.
Bromus arvensis L.	+	+	+	+	+	+	Epoec.
Bromus secalinus L.	+	+	+	+	+	+	Epoec.

Digitaria ischaemum (Schreb.) Muehl.	+	+	+		+		Epoec.
Digitaria sanguinalis (L.) Scop.	+	+		+	+	+	Agr.-epoec.
Echinochloa crus-galli (L.) P. Beauv.	+	+	+	+	+	+	Agr.-epoec.
Hordeum murinum L.	+		+	+	+	+	Epoec.
Lolium remotum Schrank		+	+				Epoec.
Lolium temulentum L.	+	+	+	+			Epoec.
Sclerochloa dura (L.) P. Beauv.	+			+	+	+	Epoec.
Secale cereale L.	+	+	+	+	+	+	Erg.
Setaria glauca (L.) P. Beauv.	+	+	+	+	+	+	Agr.-epoec.
Setaria verticillata (L.) P. Beauv.	+	+	+	+	+	+	Epoec.
Setaria viridis (L.) P. Beauv.	+	+	+	+	+	+	Epoec.
Magnoliopsida							
Apiaceae							
Aethusa cynapium L.	+	+	+	+		+	Epoec.
Bifora radians M. Bieb.						+	Epoec.
Bupleurum rotundifolium L.		+	+	+	+	+	Epoec.
Caucalis platycarpos L.				+	+	+	Epoec.
Conium maculatum L.	+	+	+	+	+	+	Epoec.
Scandix pecten-veneris L.						+	Epoec.
Asteraceae							
Anthemis arvensis L.	+	+	+	+	+		Epoec.
Anthemis cotula L.	+	+	+	+	+		Epoec.
Artemisia abrotanum L.	+		+	+	+		Agr.
Artemisia absinthium L.	+	+	+	+	+	+	Agr.-epoec.

Carduus acanthoides L.	+	+	+	+	+	+	Epoec.
Carduus nutans L.	+?	+	+	+	+		Epoec.
Centaurea cyanus L.	+	+	+	+	+	+	Epoec.
Chrysanthemum segetum L.		+		+			Ephem.
Cichorium intybus L.	+	+	+	+	+	+	Agr.-epoec.
Crepis capillaris (L.) Wallr.	+			+			Agr.-epoec.
Lactuca serriola L.	+	+	+	+	+	+	Epoec.
Matricaria recutita L.	+	+	+	+	+	+	Epoec.
Onopordon acanthium L.	+	+	+	+	+	+	Epoec.
Senecio vulgaris L.	+	+	+	+	+	+	Epoec.
Sonchus arvensis L.	+	+	+	+	+	+	Epoec.
Sonchus asper (L.) Hill	+	+	+	+	+	+	Epoec.
Sonchus oleraceus L.	+	+	+	+	+	+	Epoec.
Tripleurospermum inodorum (L.) Sch. Bip.	+	+	+	+	+	+	Epoec.
Xanthium strumarium L.	+	+	+	+	+	+	Ephem.
Boraginaceae							
Anchusa officinalis L.	+	+	+	+	+		Epoec.
Buglossoides arvensis (L.) I.M. Johnst.	+	+	+	+	+	+	Epoec.
Cynoglossum officinale L.	+	+	+	+	+	+	Epoec.
Lappula squarrosa (Retz.) Dumort.	+	+	+	+	+	+	Epoec.
Lycopsis arvensis L.	+	+	+	+	+	+	Epoec.
Myosotis arvensis (L.) Hill	+	+	+	+	+	+	Epoec.
Brassicaceae							

Brassica campestris L.	+	+	+	+	+	+	Epoec.
Camelina alyssum (Mill.) Thell.			+	+			Epoec.
Camelina microcarpa Andrz.	+	+	+	+	+	+	Ephem.
Camelina sativa (L.) Crantz	+	+	+	+	+		Erg.
Capsella bursa-pastoris (L.) Medik.	+	+	+	+	+	+	Epoec.
Conringia orientalis (L.) Dumort.			+	+	+	+	Epoec.
Coronopus squamatus (Forssk.) Asch.	+			+		+	Epoec.
Descurania sophia (L.) Webb Ex Prantl	+	+	+	+	+	+	Epoec.
Erysimum cheiranthoides L.	+	+	+	+	+		Epoec.
Erysimum repandum L.	+	+	+	+	+	+	Epoec.
Lepidium campestre (L.) R. Br.	+	+	+	+	+	+	Epoec.
Lepidium ruderale L.	+	+	+	+	+	+	Epoec.
Neslia paniculata (L.) Desv.	+	+	+	+	+	+	Epoec.
Raphanus raphanistrum L.	+	+	+	+	+		Epoec.
Sinapis alba L.	+	+	+	+	+	+	Erg.
Sinapis arvensis L.	+	+	+	+	+	+	Epoec.
Sisymbrium officinale (L.) Scop.	+	+	+	+	+	+	Epoec.
Thlaspi arvense L.	+	+	+	+	+	+	Epoec.
Caryophyllaceae							
Agrostemma githago L.	?+	?+	?+	+		+	Ephem.
Herniaria hirsuta L.					+		Ephem.
Scleranthus annuus L.	+	+	+	+	+	+	Epoec.
Silene gallica L.		+	+	+			Ephem.
Spergula arvensis L.	+	+	+	+	+		Epoec.

Spergula maxima Weihe	+	+	+	+	+		Epoec.
Vaccaria hispanica (Mill.) Rauschert		+	+	+	+	+	Epoec.
Chenopodiaceae							
Atriplex prostrata Bouher ex DC.		+	+	+	+		Epoec.
Atriplex sagittata Borkh.	+	+	+	+	+	+	Agr.-epoec.
Chenopodium bonus-henricus L.	+	+	+	+			Epoec.
Chenopodium ficifolium Smith	+		+	+			Epoec.
Chenopodium hybridum L.	+	+	+	+	+	+	Epoec.
Chenopodium murale L.	+	+		+	+		Epoec.
Chenopodium opulifolium Schrad. ex DC.	+	+	+	+	+	+	Epoec.
Chenopodium polyspermum L.	+	+	+	+	+	+	Epoec.
Chenopodium vulvaria L.	+	+	+	+	+	+	Epoec.
Cucurbitaceae							
Brionia dioica Jacq.	+	+	+	+		+	Epoec.
Cuscutaceae							
Cuscuta epilinum Weihe		+	+	+			Ephem.
Euphorbiaceae							
Euphorbia exiqua L.	+	+		+		+	Epoec.
Euphorbia falcata L.				+	+	+	Epoec.
Euphorbia helioscopia L.	+	+	+	+			Epoec.
Euphorbia peplus L.	+	+	+	+			Epoec.
Euphorbia plathyphyllos L. (?)	+	+	+	+		+	Epoec.

Fabaceae							
Lathyrus tuberosus L.	+			+	+	+	Agr.-epoec.
Vicia hirsuta S.F. Gray	+	+	+	+	+	+	Epoec.
Vicia pannonica Crantz					+		Agr.-epoec.
Vicia tetrasperma (L.) Schreb.	+	+	+	+	+	+	Epoec.
Vicia villosa Roth	+	+	+	+	+	+	Agr.-epoec.
Fumariaceae							
Fumaria officinalis L.	+	+	+	+	+	+	Epoec.
Fumaria schleicheri Soy.-Willem.	+	+	+	+	+	+	Epoec.
Fumaria vaillantii Loisel.			+	+	+	+	Epoec.
Geraniaceae							
Geranium dissectum L.	+	+	+	+		+	Epoec.
Geranium pusillum L.	+	+	+	+	+	+	Epoec.
Lamiaceae							
Ajuga chamaepitys (L.) Schreb.		+	+				Agr.-epoec.
Ballota nigra L.	+	+	+	+	+	+	Agr.-epoec.
Galeopsis ladanum L.	+	+	+	+	+	+	Epoec.
Lamium album L.	+	+	+	+	+	+	Agr.-epoec.
Lamium amplexicaule L.		+	+	+		+	Epoec.
Lamium purpureum L.	+	+	+	+	+	+	Epoec.
Leonurus cardiaca L.	+	+		+	+		Epoec.
Marrubium vulgare L.	+	+	+	+	+	+	Ephem.
Nepeta cataria L.	+	+	+	+	+	+	Epoec.
Stachys annua (L.) L.	+			+			Epoec.

Malvaceae							
Althaea officinalis L.	+	+	+	+	+	+	Agr.
Hibiscus trionum L.	+			+	+	+	Epoec.
Malva neglecta Wallr.	+	+	+	+	+	+	Epoec.
Malva pusilla Smith	+	+	+	+	+	+	Epoec.
Papaveraceae							
Papaver argemone L.		+		+	+	+	Epoec.
Papaver dubium L.				+	+	+	Epoec.
Papaver rhoeas L.	+	+	+	+	+	+	Epoec.
Papaver strigosum (Boenn.) Schur						+	Epoec.
Polygonaceae							
Persicaria linicola (Sutulov) Nenjukov	+						Ephem.
Portulacaceae							
Portulaca oleracea L.	+	+	+	+	+	+	Agr.-epoec.
Primulaceae							
Anagalis arvensis L.	+	+	+	+	+	+	Epoec.
Anagalis foemina Mill.					+	+	Epoec.
Ranunculaceae							
Adonis aestivalis L.	+	+	+	+	+		Ephem.
Adonis flammea Jacq.		+			+		Ephem.

Consolida regalis S.F. Gray	+		+	+			Epoec.
Nigella arvensis L.	+	+		+	+	+	Epoec.
Ranunculus arvensis L.	+	+		+		+	Epoec.
Resedaceae							
Reseda luteola L.	+				+	+	Erg.
Rosaceae							
Aphanes arvensis L.			+			+	Epoec.
Rubiaceae							
Galium spurium L.	+	+	+	+	+	+	Epoec.
Galium tricornutum Dandy					+	+	Agr.-epoec.
Sherardia arvensis L.	+	+	+		+	+	Agr.-epoec.
Salicaceae							
Salix fragilis L.	+	+	+	+	+	+	Agr.
Scrophulariaceae							
Kickxia elatine (L.) Dumort.	+						Epoec.
Kickxia spuria (L.) Dumort.						+	Epoec.
Misopates orontium (L.) Raf.	+				+	+	Ephem.
Odontites vernus (Bellardi) Dumort.	+						Epoec.
Rhinanthus apterus (Fr.) Ostenf.			+	+			Epoec.
Veronica agrestis L.		+		+			Epoec.
Veronica arvensis L.	+	+	+	+	+	+	Epoec.
Veronica opaca Fr.	+		+				Ephem.

Veronica polita Fr.	+	+	+	+	+	+	Agr.-epoec.
Veronica triphyllos L.	+	+	+		+	+	Epoec.
Solanaceae							
Lycium barbatum L.	+	+	+	+	+	+	Epoec.
Solanum nigrum L.	+	+	+	+	+	+	Epoec.
Thymelaeaceae							
Thymelaea passerina (L.) Coss. Et Germ.			+	+	+		Epoec.
Urticaceae							
Urtica urens L.	+	+	+	+	+	+	Epoec.
Valerianaceae							
Valerianella dentata (L.) Poll.	+	+	+	+			Epoec.
Valerianella locusta (L.) Laterr.		+	+	+		+	Epoec.
Valerianella rimosa Bast.	+		+	+	+	+	Agr.-epoec.
Verbenaceae							
Verbena officinalis L.	+	+	+	+	+	+	Epoec.
Violaceae							
Viola arvensis Murray	+	+	+	+	+	+	Epoec.

Symbols indicate: Carp. – Carpathian region (Transcarpathian, Carpathian Mountains, Cis-Carpathian), Rozt.-Opil. – Roztochchya-Opillya, L. & R. Forest-Steppe region of Ukraine – Left- & Right-Bank Forest-Steppe region of Ukraine, L. & R. Steppe region of Ukraine – Left- & Right-Bank Steppe region of Ukraine, /Nat. – natural, Agr. – agriophytes, Agr.-epoec. – agrio-epoecophytes, Erg. – ergasiophytes, ephem. - ephemerophytes.

Tab. 2. Characteristics of archaeophytes with high invasive capability.

Species	Origin	Distribution on ecotopes: 19th century, according to A. Rogovich, 1868 and I. Shmalhausen, 1895/97)				Modern distribution on ecotopes: 21st century			
		Anthr.	Semi-nat.	Nat.	Status	Anthr.	Semi-nat.	Nat.	Status
* *Acorus calamus*	S. & S-E Asia			+/S	Agr.		+/C	+/C	Agr.
* *Anisantha tectorum*	Med.-E. Tur	+/C			Epoec.	+/C	+/C	+/L	Agr.-epoec.
Artemisia absinthium	Ir.-Tur.	+/C			Epoec.	+/C	+/S		Agr.-epoec.
Artemisia abrotanum	S-W As.	+/L		+/L	Agr.		+/S	+/S	Agr.
Atriplex sagittata	Med.-Ir.-Tur.	+/S			Epoec.	+/C	+/S		Agr.-epoec.
* *Ballota nigra*	Med.-Ir.-Tur.	+/C			Epoec.	+/C	+/C	+/L	Agr.-epoec.
Brassica campestris	C. As.	+/C			Epoec.	+/C			Epoec.
* *Capsella bursa-pastoris*	? origin	+/C			Epoec.	+/C	+/C	+/S	Agr.-epoec.
Carduus acanthoides	Med.	+/S			Epoec.	+/C	+/S		Epoec.
Conium maculatum	Med.-Ir.-Tur.	+/C			Epoec.	+/C			Epoec.
Descurania sophia	Ir.-Tur.	+/C			Epoec.	+/C	+/S		Epoec.
* *Echinochloa crus-galli*	As.	+/S			Epoec.	+/C	+/C		Epoec.

Galeopsis ladanum	Med.	+/C				Epoec.	+/C			Epoec.
**Hordeum murinum*	Med.-Ir.-Tur.	+/S				Epoec.	+/S	+/S		Epoec.
* *Lactuca serriola*	Med.-Ir.-Tur.	+/C				Epoec.	+/C	+/C		Epoec.
Lepidium ruderale	Ir.-Tur.	+/C				Epoec.	+/C			Epoec.
Lycium barbarum	E. As.	+/C				Epoec.	+/C			Epoec.
Malva neglecta	Ir.-Tur.	+/C				Epoec.	+/C			Epoec.
Malva pusilla	Res.	+/C				Epoec.	+/C			Epoec.
Papaver rhoeas	Med.-Ir.-Tur.	+/S				Epoec.	+/C	+/C		Epoec.
* *Portulaca oleracea*	Ir.-Tur.	+/S				Epoec.	+/C	+/S	+/L	Agr.-epoec.
Raphanus raphanistrum	Med.	+/C				Epoec.	+/C			Epoec.
* *Senecio vulgaris*	As.	+/C				Epoec.	+/C			Epoec.
Salix fragilis	As. Min.	+/S	+/S	+/S		Agr.	+/S	+/S	+/C	Agr.
* *Setaria glauca*	Ind-Mal.	+/S				Epoec.	+/C	+/C	+/S	Agr.-epoec.
* *Setaria viridis*	Med.-Ir.-Tur.	+/C				Epoec.	+/C	+/S		Epoec.
Sinapis arvensis	Med.-Atl.	+/S				Epoec.	+/S			Epoec.
Sonchus arvensis	Med.	+/C	+/C			Epoec.	+/C	+/C		Epoec.
Sonchus asper	Med.	+/C	+/C			Epoec.	+/C	+/C		Epoec.
Sonchus oleraceus	Med.	+/C				Epoec.	+/C			Epoec.
* *Tripleurospermum inodorum*	W. As.	+/C				Epoec.	+/C	+/C	+/C	Epoec.

Vicia villosa	Med.	+/S		Epoec.	+/C	+/C	+/C	Agr.-epoec.

Symbols indicate:
S.-S-E As. – South and South-East Asia, S. & SW As. – South and South-West Asia,
As. – Asia, E. As. – East Asia, As. Min. – Asia Minor, W As. – West Asia,
Ir.-Tur. – Irano-Turanian, Med. – Mediterranean, Med.-Ir.-Tur. – Mediterraneen-Irano-Turanian,
Med.-E.Tur. Mediterranean-East Turanian, Med.-Atl. – Mediterranean-Atlantic,
Ind.-Mal. – Indo-Malay, Res. – resistance, Antrop. – anthropogenic, ? – unknown origin;
Ant. – anthropogenic, Sem-nat.- seminatural, Nat.- natural ecotopes,
Epoec.- epoecophytes, Agr. – Agriophyte, Agr.-Epoec. - agrioepoecophyte;
C – common, S – sporadically, L – locally,
* - species with active distribution.

Tab. 3. Characteristics of archaeophytes species with the regressive ranges.

Species	Origin	Distribution on ecotopes: 19th century, according A. Rogovich, 1868 and I. Shmalhausen, 895/97)			Modern distribution on ecotopes: 21st century		
		Anthr.	Semi-nat.	Status	Anthr.	Semi-nat.	Status
Agrostemma githago	Anthrop.	+/C		Epoec.	+/R		Ephem.
Avena cultiformis	Med.	+/S		Epoec.	+/R		Ephem.
Avena fatua	Ir.-Tur.	+/C		Epoec.	+/R		Ephem.
Avena strigosa	Antrop.	+/S		Epoec.	+/R		Ephem.
Cuscuta epilinum	Antrop.	+/S		Epoec.	+/R		Ephem.
Marrubium vulgare	Med.-			Epoec.			Ephem.
	Ir.-Tur	+/S	+/S		+/R		
Persicaria linicola	Antrop.	+/S		Epoec.	+/R		Ephem.
Urtica urens	Med.	+/C		Epoec.	+/R		Epoec.
Xanthium strumarium	Ir.-Tur.	+/C		Epoec.	+/R	+/R	Ephem.

Symbols indicate:
Med. – Mediterranean, Ir-Tur. – Irano-Turanian,
Med.-Ir.-Tur. – Mediterranean-Irano-Turanian, Antrop. – anthropogenic origin;
Ant. – anthropogenic, Sem-nat.- seminatural, Nat.- natural ecotopes;
Ephem. - ephemerophytes, Epoec.- epoecophytes; C – common, S – sporadically, R - rare.