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Hordeetum murini Libbert, 1932 – A ruderal association in Kosovo

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ABSTRACT

The paper deals with the vegetation of the association *Hordeetum murini* Libbert 1932 (*Sisymbrietalia*, *Sisymbriion*) in Kosovo. It is one of six ruderal communities studied in Kosovo during 1988 – 1991. The association *Hordeetum murini* is a ruderal vegetation that appears later in the spring and disappear in the beginning of the summer. This association is well developed in all habitats of Kosovo. This paper deals with the floristic and syntaxonomic analysis of association (Table 1), which encapsulates 12 relevés out of 62 species. It was also analyzed the biological spectrum of association, and symbols of life forms of each species. Also, in the analysis of floral geoelements, groups of these elements have been determined and presented by its spectrum.

Key words: *Hordeum murinum*, ruderal, community, syntaxonomy, Kosovo.

Hordeetum murini Libbert, 1932 – RUDERALNA ASSOCIACIJA NA KOSOVU

IZVLEČEK

Članek obravnava vegetacijo asociacije *Hordeetum murini* Libbert, 1932 (*Sisymbrietalia*, *Sisymbriion*) na Kosovu. Asociacija je ena izmed šestih znanih ruderalnih združb na Kosovu. Tovrstne združbe so bile na Kosovu preučevane med letoma 1988 in 1991, vendar uspevanje obravnavane asociacije *Hordeetum murini*, na tem območju, do sedaj ni bilo znano, in je v tem članku tako prvič obravnavana. To je ruderalna vegetacija, ki se optimalno razvije pozno pomladi in se posuši na začetku poletja. Omenjena asociacija je dobro razvita v vseh predelih Kosova. Floristična sestava asociacije, ki je predstavljena z 12 vegetacijskimi popisi, je razvidna iz analitične fitocenološke tabele (Tabela 1), v kateri je skupno 62 vrst rastlin. Analiziran je tudi biološki spekter življenjskih oblik. Poleg tega, je bila za asociacijo narejena analiza in spekter flornih geoelementov, pri čemer so bile vrste uvrščene v 13 skupin geoelementov.

Ključne besede: *Hordeum murinum*, ruderalen, združba, sintaksonomija, Kosovo.

1 INTRODUCTION

The research of flora and vegetation in Kosovo, undertaken so far, are indicating their richness and their relative abundance. In these researches are incorporated almost all types of vegetation, starting from the vegetation of hilly-forests in Kosovo (Krasniqi, 1972), vegetation of pasture ground communities, vegetation of lower meadows, vegetation of segetal plants (Kojić, Pejčinović, 1982). However, one part of this vegetation, particularly the ruderal one, has not been researched until recently.

In Southeast Europe there have been researches done also on ruderal vegetation. The first studies were done by Oberdorfer. As per the data given by Markovic (1978) we can say that the research on ruderal vegetation has been done in different parts of the Balkan peninsula, such as in Vojvodina (Slavnić), in Croatia (Horvat, Horvatić, Marković, 1965, 1969, 1975, 1979, 1980, 1984, 1987,). In regards to other areas there are known researches of Aichinger, Oberdorfer, Slavnić, Lakušić, Tomić-Stanković, Trinajstić. Later on this

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vegetation was researched also in Macedonia (Matvejeva, 1982).

The relief of Kosovo was formed during the Orogenic phase. The mountains appeared above water during Miocene, whereas ponds, valleys, Fushë-Kosova, during Pliocene. The region of Kosovo represents an important link of the south-eastern branch of Alpine range (Dinaric-Albanic-Hellenic mountain range). Within a small territory one can discern a variety of geological formations of different ages, from the Precambrian to the Quaternary periods (Meçaj 1999).

As far as the climate is concerned, Kosovo belongs to the Mediterranean, with a slight influence of the continental climate. Moreover, in the Fushë-Kosova plain one can notice a small influence of the steppe climate. So Kosova in general has wet, relatively short and cold at winter, whereas summers are hot and relatively dry. The average year air temperature revolves from 9.5⁰C (Prishtina) to 12 ⁰C (Prizren). The average yearly rains revolve from 600 mm/year in the eastern region to 900 mm/year in the western ones (Peja

and Gjakova), and over 1.500 mm/year in the Bjeshkët e Namuna (Krutaj 1999).

Viewed from its horizontal position, vegetation in Kosovo belongs mainly to the Euro-Siberian vegetative region. According to Horvatić (1967:31), the hot valleys of the low parts of Kosovo belong to the Aegean province. The highest part of Kosovo belongs to the Moesic province, whereas smaller part in North-West belongs to the Illyrian one. The highest zones belong to the Nordic-Alpic region. Therefore, Kosovo is a cross-road of influences of three phyto-geographical regions. In Kosovo about 2.400 species of vascular flora have been established (Pajazitaj 2004). If we have in mind that in the Balkans there are approximately 6.800 vascular species, then we can conclude that the flora of Kosovo represents around 35% of this flora. The flora of Kosovo appears to be even more interesting because of the participation of approximately 200 endemic and relict species. Even though the surface of its territory represents 2.3% of the Balkans, the endemic and relicts species represent 11% of these plants within the Balkan Peninsula (Sala 1999).

2 MATERIAL AND METHODS

Ruderal vegetation was investigated according to the principles of the Zürich-Montpellier School. The scientific names of plants were coordinated with Forstner & Hübl (1971). The species were also analyzed according to biological

forms taken from Horvat (1949). The floral geoelements were determined according to Horvat, Glavač, Ellenberg (1974), and Forstner & Hübl (1971) and Flora of Albania (1988-2000).

3 RESULTS AND DISCUSSION

Association *Hordeetum murini* belongs to the alliance *Sisymbriion*, order of *Sisymbrietalia* and class of *Chenopodietea*.

This ruderal community develops almost exclusively beside roads, streets, and more rarely also in places that have been stepped on near houses and apartments, particularly in the outskirts of cities or big settlements. The development of this community begins during the month May and continues until the beginning of summer.

The floristic composition of this ruderal community is shown in the analytical table (Table 1), which include

12 relevés which were done in these localities of Kosovo, while the investigated area are presented in the map of Kosovo (Fig.1).

The characteristic species of the association in the researched area of Kosovo can be discerned: *Hordeum murinum* L., as a dominant one, which has also a high level of presence (Tab.1)

Tab.1. Analytical table of association *Hordeetum murini* Libbert 1932

Life forms	Relevé number	1	2	3	4	5	6	7	8	9	10	11	12	Presence	
	Surface (in m ²)	30	10	30	30	40	15	60	20	40	6	30	15		
	Cover (in %)	90	100	90	100	100	100	100	100	100	100	100	90		
	Number of species	26	19	19	17	17	15	15	15	14	14	14	11		
ASSOCIATION CHARACTERISTIC SPECIES															
H	<i>Hordeum murinum</i> L.	3.3	3.3	2.3	4.4	3.3	4.4	5.4	4.4	5.4	4.3	4.4	3.3	V	
CHARACTERISTIC SPECIES OF SISYMBRION AND SISYMBRIETALIA															
T	<i>Sisymbrium officinale</i> (L.) Scop.	1.1	.	1.1	.	.	.	.	1.2	.	.	1.1	.	II
T	<i>Lactuca serriola</i> Tomer	+1	.	.	+1	.	.	.	.	+1	1.1	.	.	II
T	<i>Bromus tectorum</i> L.	.	+2	.	.	.	.	.	.	.	.	.	.	I
CHARACTERISTIC SPECIES OF CHENOPODIETEA															
T	<i>Capsella bursa-pastoris</i> (L.) Med.	+1	.	+2	+1	+1	.	+2	1.2	.	1.1	.	+2	IV	
H	<i>Carduus acanthoides</i> L.	1.1	2.1	1.1	1.1	1.1	1.1	1.1	.	.	1.1	.	.	IV	
T	<i>Bromus sterilis</i> L.	+2	.	.	.	+2	+2	+2	.	.	.	.	+2	III
H	<i>Onopordum acanthium</i> L.	1.1	.	1.1	1.1	.	.	.	1.1	.	.	.	.	II
H	<i>Malva sylvestris</i> L.	.	.	1.2	.	1.2	.	.	.	.	1.2	1.2	.	II
H	<i>Cardaria draba</i> (L.)Desv.	+1	.	.	2.2	.	.	1.1	.	.	.	.	1.1	II
T	<i>Sonchus oleraceus</i> L.	.	.	.	.	+1	.	.	.	.	.	.	.	I
OTHER SPECIES															
H	<i>Lolium perenne</i> L.	+2	+2	+2	.	1.2	+2	.	1.2	+2	+2	+2	+2	V	
H	<i>Poa pratensis</i> L.	+2	+2	+2	.	+2	+2	+2	.	+2	.	+2	.	IV	
H	<i>Arctium lappa</i> L.	.	.	1.1	.	.	1.1	.	.	1.1	.	1.1	1.1	III	
H	<i>Rumex crispus</i> L.	.	1.1	1.1	.	.	1.1	1.1	.	.	.	.	1.1	III
H	<i>Taraxacum officinale</i> Web	+1	.	1.1	.	1.1	.	+1	.	+1	.	1.1	.	III	
G	<i>Convolvulus arvensis</i> L.	+1	+2	.	1.2	.	+2	+2	+2	.	.	+2	.	III	
H	<i>Dactylis glomerata</i> L.	+1	+2	.	.	.	.	1.2	.	+2	.	+2	+2	III
T	<i>Bromus mollis</i> L.	+2	+2	+2	+2	.	+1	.	.	.	+2	.	.	III	
H	<i>Lolium multiflorum</i> Lam.	+2	+2	+2	+2	.	.	.	.	+2	.	.	.	III
H	<i>Cardaria draba</i> (L.)Desv.	+1	.	.	2.2	.	.	1.1	.	.	.	.	1.1	II
H	<i>Conium maculatum</i> L.	.	.	.	.	.	.	2.1	+1	.	1.2	.	1.2	II
H	<i>Plantago major</i> L.	.	.	.	.	2.1	.	.	+1	1.1	.	.	.	II
H	<i>Ballota nigra</i> L.	1.2	.	.	.	2.2	.	1.2	.	.	.	.	.	II
H	<i>Achillea millefolium</i> L.	.	1.1	.	1.2	.	1.2	.	.	.	.	.	.	II
H	<i>Artemisia vulgaris</i> L.	.	.	.	.	.	.	1.2	.	.	.	1.2	+1	II
H	<i>Cichorium intybus</i> L.	.	.	.	+1	1.1	1.1	.	.	.	.	.	.	II
H	<i>Plantago lanceolata</i> L.	.	.	.	.	.	+1	.	.	+2	1.1	.	.	II
H	<i>Tripleurospermum inodorum</i> Schulz-Bip	+1	1.1	.	.	+1	.	.	.	.	.	.	.	II
T	<i>Anthemis austriaca</i> Jacq.	1.2	+1	.	+2	.	.	.	.	.	.	.	.	II
H	<i>Trifolium repens</i> L.	+2	.	+2	.	.	.	.	.	+2	+2	.	.	II
T	<i>Matricaria chamomilla</i> L.	.	.	+2	.	+2	.	.	.	+2	.	.	+2	II	
H	<i>Trifolium pratense</i> L.	+2	.	+2	.	.	.	.	.	+2	.	+2	.	II
T	<i>Bromus arvensis</i> L.	+2	+2	.	.	.	+2	.	.	.	.	.	.	II
H	<i>Polygonum aviculare</i> agg.L.	.	.	+2	.	.	.	+2	+2	.	.	.	.	II
T	<i>Erodium cicutarium</i> (L.) L'Her.	+2	+1	.	.	.	+1	.	.	.	.	.	.	II
H	<i>Anchusa officinalis</i> L.	.	.	1.1	.	.	.	.	.	.	1.2	.	.	I
H	<i>Cirsium arvense</i> (L.) Scop.	.	.	+1	.	.	.	1.1	.	.	.	.	.	I
T	<i>Consolida regalis</i> S.F.Gay.	1.1	+1	.	.	.	.	.	.	.	.	.	.	I
T	<i>Medicago lupulina</i> L.	.	.	.	.	+2	.	.	.	.	.	+2	.	I
H	<i>Silene vulgaris</i> (Mnch.)Garcke	.	.	.	.	.	.	.	+2	.	+1	.	.	I
T	<i>Torilis arvensis</i> (Huds.)Link.	.	.	.	+1	.	.	.	.	.	.	+1	.	I
H	<i>Poa trivialis</i> L.	.	.	.	.	+2	.	.	.	+2	.	.	.	I

Less common species: 1. *Artemisia absinthium* L. 1.1, 2. *Rumex obtusifolius* L. 1.1; 3. *Berteroa incana* (L.) DC. 1.1; 4. *Tragopogon orientalis* L. 1.1; 5. *Atriplex tatarica* L. 1.1; 6. *Poa silvicola* Guss. +2; 7. *Festuca pratensis* Huds. +2; 8. *Bromus inermis* Leyss. +2; 9. *Arrhenatherum elatius* (L.)Presl. +2; 10. *Agropyron repens* (L.) P.B.+2, 11. *Galium tricorneum* Dandy +2, 12. *Poa annua* L. +2, 13. *Alopecurus myosuroides* Huds. +2, 14. *Atriplex oblongifolia* W.et K. +1, 15. *Geranium pusillum* L. +1, 16. *Potentilla inclinata* Vill. +1, 17. *Anthemis arvensis* L. +1, 18. *Haynaldia villosa* (L.) Schur. +1, 19. *Eryngium campestre* L. +1, 20. *Tragopogon dubius* Scop. +1.



Fig.1. Localities in Kosovo where the investigated have been registered are as follows: **1** Gjilan - beside the road at the entrance of the city towards Prishtina, on a surface slightly turned towards the south, (12.VI.1990), **2**. Klina, beside the road which connects this settlement with the Prishtina – Peja motorway (10.VI.1990), **3**. Suhareka, near the main road at the centre of the settlement, **4**. Fushë-Kosova, near the main road at the outskirts of the settlement towards Prishtina (6.VI.1990). **5,7,12**, Prishtina, near the roads in the outskirts of city, (20,25, 30.VI.1990), **6**. Kamenica, near the road at the entrance of the settlement, on a slightly skewed surface, turned towards the east (12.VI.1990), **8, 11**, Podujeva, beside the road of settlement (7.VI.1990), **9**, Peja, beside the road, in the city centre (10.VI.1990), **10**. Kerpimeh (Podujeva), near the wall of an inhabited house at the centre of the village (7.VI.1990).

In Croatia (Marković-Gospodarić, 1965) as specific species of association *Hordeetum murini* are regarded: *Hordeum murinum*, *Malva silvestris* and *Bromus sterilis* whereas in Macedonia (Matvejeva,1982) distinguishes only *Hordeum murinum*. Also, in Croatia, (Marković-Gospodarić,1965) within the notes association two sub-associations are differentiated (*Arctium minus-Tripleurospermum inodorum* and normal), whereas in

Macedonia (Matvejeva,1982) there are no sub-associations.

Having in mind floral composition of the investigated associations in Croatia, and in Macedonia, I'm of the opinion that the association *Hordeetum murini* which was investigated in Kosovo, belongs primarily to the ruderal association of the Sub-Mediterranean type. This is proven by the number of species (about 60), which is

nearly the same in both associations (in Kosovo and Macedonia), whereas in regard to the investigated association in Croatia it appears to be closer to ruderal associations of Central Europe. This is evident from the number of the species (121), and localities where relevés was carried out (mainly in the vicinity of Zagreb) (Marković-Gospodarić,1965:100-101).

In general, this community includes a relatively big number of species be that of a certain class or other ones, some of which have a high level of presence, such as *Capsella bursa-pastoris* (L.) Med.,*Carduus acanthoides* L., *Lolium perenne* L. and *Poa pratensis* L. The general number of species of such a community is relatively big (62), but a small number of them have two of the highest levels of presence (8%). The number of species in relevés revolves from 26 to 11, which in average is 16 species for each relevé.

As part of the association *Hordeetum murini*, several sub-associations have been described in the territory of Europe. The individuals of this association in the researched area of Kosovo can be attached to the sub-association *Hordeetum murini typicum* Tx.et Siss., 1942.

The development of this community begins at the end of April, continues during the month of May, while it reaches the optimum of its development in the first half of June. At the beginning of summer the drying up of the dominant species begins (*Hordeum murinum*), and it continues with the development of other hemicryptophytes, and some of them even develop towards the end of summer (for example *Atriplex tatarica*, *Chenopodium sp.* etc.).

The individuals of this association develop on dry surfaces, which are warm and exposed to the sun, and which are under the influence of three anthropozoogen factors: non-intensive stepping, insufficient fertilization and grazing, and non-intensive mowing respectively. This community normally does not develop in shadowy places. The community can develop for several years under the influence of these factors. On the contrary, it can recede very quickly and be replaced by the increasingly dominant hemicryptophytes, which contributes to the formation of the community of the association *Tanaceto-Artemisietum* (Markovic, 1965:102). It must be noted that on this occasion, in the researched area we have not followed the syn-dynamics of this community.

The biological specter of species of this association, which is calculated from the phytogeographical table, is as per below: Therophytes – 25 species or 40.32%, Hemicryptophytes 35 species or 56.45% and Geophytes 2 species or 3.23% As it can be seen, hemicryptophytes

are dominant, followed by therophytes whilst the number of geophytes is minimal.(Tab.2).

Tab.2 Biological spectrum of life forms

Life forms	Number of taxa	%
H	35	56.45
T	25	40.32
G	2	3.23
Total	62	100.00

The floristic composition of the association of *Hordeetum murini* belongs to 13 geo-floristic elements. Below are presented the species of every floral geoelements group: **European-Asiatic species:** *Achillea millefolium*, *Arctium lappa*, *Artemisia absinthium*, *Atriplex tatarica*, *Bromus inermis*, *Bromus tectorum*, *Cardaria draba*, *Cirsium arvense*, *Conium maculatum*, *Dactylis glomerata*, *Festuca pratensis*, *Matricaria recutita*, *Medicago lupulina*, *Onopordum acanthium*, *Plantago lanceolata*, *Plantago major*, *Poa trivialis*, *Polygonum aviculare*, *Potentilla inclinata*, *Rumex crispus*, *Silene vulgaris*, *Sonchus oleraceus*, *Taraxacum officinale*, *Tragopogon orientalis*, *Trifolium pretense*, *Trifolium repens*, *Tripleurospermum inodorum*; **Sub-Mediterranean species:** *Alopecurus myosuroides*, *Ballota nigra*, *Bromus sterilis*, *Galium tricoratum*, *Hordeum murinum*, *Lolium multiflorum*, *Torilis arvensis*, *Tragopogon dubius*; **European-Asiatic Sub-Mediterranean species:** *Bromus arvensis*, *Bromus mollis*, *Consolida regalis*, *Geranium pusillum*, *Lactuca serriola*, *Malva sylvestris*, *Sisymbrium officinale*; **Cosmopolitan species:** *Capsella bursa-pastoris*, *Cichorium intybus*, *Convolvulus arvensis*, *Lolium perenne*, *Poa annua*, *Poa pratensis*; **Central European species:** *Anthemis austriaca*, *Carduus acanthoides*; **Circumpolar species:** *Agropyron repens*, *Artemisia vulgaris*; **Euro-Asiatic Mediterranean species:** *Anthemis arvensis*, *Erodium cicutarium*; **Sub-Mediterranean Sub-Atlantic species** *Arrhenatherum elatius*, *Rumex obtusifolium*; **South-European species:** *Haynaldia villosa*, *Poa silvicola*; **Pontic species:** *Anchusa officinalis*; **Sub-Mediterranean-Pontic species:** *Berteroa incana*; **Continental species:** *Atriplex oblongifolia*; **Pontic-Mediterranean species:** *Eryngium campestre*.

The spectrum of floral geoelements of 62 species confirms these percentages: European-Asiatic (27 species or 43.54%), Sub-Mediterranean (8 species or 12.90%), European-Asiatic-Sub-Mediterranean (7 species or 11.29%), Cosmopolitan (6 species or 9.67%), Central-European (2 species or 3.22%), South-European (2 species or 3.22%), Circumpolar (2 species or 3.22%), Sub-Mediterranean-Sub-Atlantic (2 species or 3.22%) and European-Asiatic-Mediterranean (2 species

or 3.22%) while the other geoelements has only one species such as Pontic, Pontic-Mediterranean, Sub-

Mediterranean-Pontic and Continental (Fig.2).

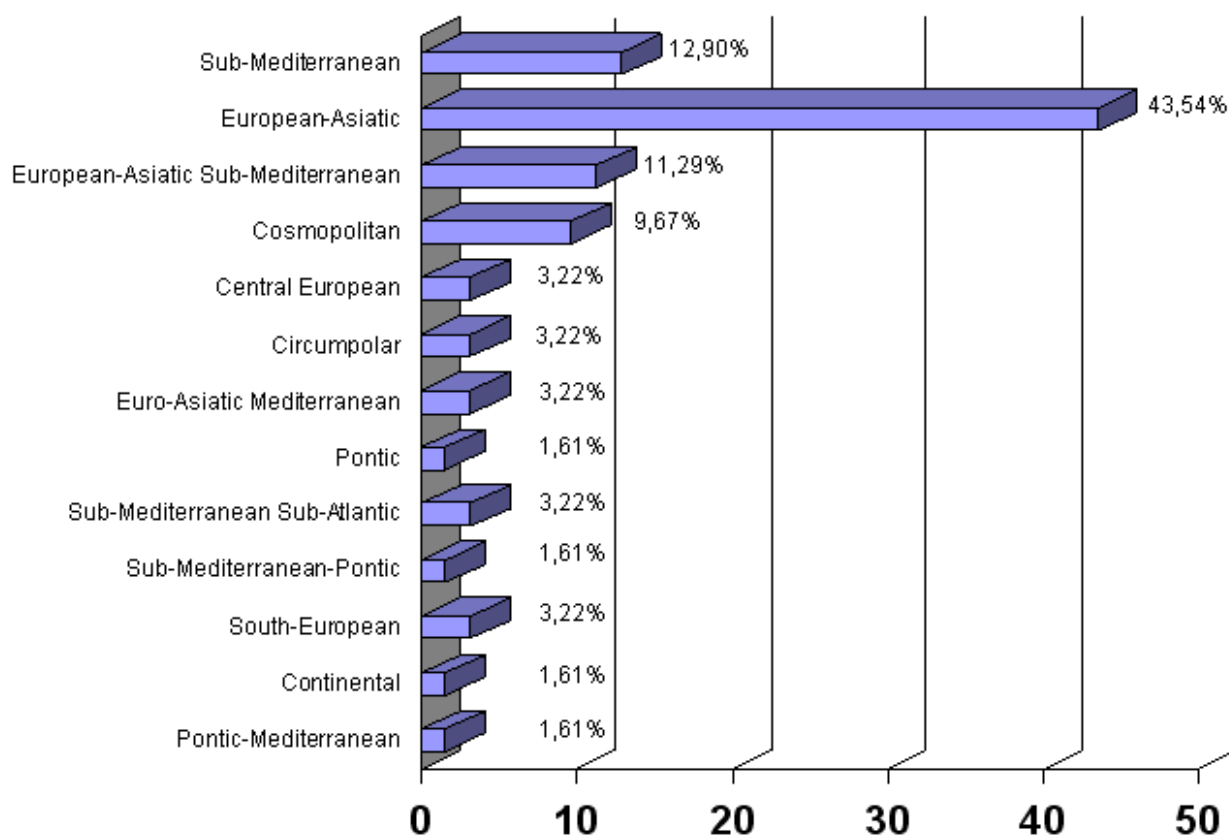


Fig. 2. Spectrum of floral geoelements

The individuals of this association are spread across the whole areas which were researched, with an almost

exclusive concentration on the peripheral parts of cities and densely populated areas.

4 CONCLUSIONS

In this study we have presented the results of the fitocenological research of the ruderal community *Hordeetum murini* in Kosovo. This ruderal community, similar to the other ones belonging to this vegetation, was not researched nor known in the territory of Kosovo. The association *Hordeetum murini* Libbert 1932, belongs to the alliance *Sisymbriion*, order *Sisymbrietalia*, and class *Chenopodiataea*. The floristic composition of the community is presented in the analytical table which contains 12 relevés from different localities of Kosova.

Characteristic species of the association in the researched territory is: *Hordeum murinum* L.. This ruderal community is characterized with a relatively big

number of species (62), out of which hemicryptophytes are dominant (35 species or 56.45 %) and therophytes (25 species or 40.32 %), while only two species was assessed as a geophytes (2 species or 3.23 %). Out of the geofloristic elements 13 groups have been differentiated, out of which the biggest number belongs to the European-Asiatic one (27 species), Sub-Mediterranean (8 species), Euro-Asiatic-Sub-Mediterranean (7 species), Cosmopolitan (6 species), and the other groups have a small number of species (2 or 1 species).

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