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Contribution to phytocenology and ecological relations of ragweed (*Ambrosia artemisiifolia* L.) in the Canton of Sarajevo

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SUMMARY

Ragweed is a neophyte which inhabits various crops and ruderal habitats. That is the reason why this paper is dedicated to phytocenology and ecological relations of ragweed in such a habitat. Research was carried out in the area of a former railway freight and customs terminal, in the period from 2021 to 2023. Phytocenological image was made and all the parameters were assessed: life form, phytocenological affiliation, floral elements, indicator values, and soil analysis. The aim of the paper is to present the places where ragweed may be found, as well as under what ecological conditions and with what other species it occurs.

This research yielded new data on the phytocenology of ragweed, determined in the vegetation of the order *Chenopodietalia*. A total of 69 species from 23 families were identified. The most numerous is the *Asteraceae* family. Phytocenologically, the largest number of species belongs to the order *Chenopodietalia*, and as far as the indicator values are concerned, the most numerous are the representatives of tertiary vegetation. Hemicryptophytes predominate regarding life forms, and concerning the floral elements, 40 different elements from 9 groups were noted. The most numerous group are Eurasian species, and the most numerous individual floral elements are euras-smed and eurassubozean-smed.

Keywords: phytocenology, hemicriptophytes, ragweed, weed, association, *Chenopodietalia.*

INTRODUCTION

Ragweed is a invasive and harmful weed of the flora of Bosnia and Herzegovina (BiH). Beck et al. (1983) state that ragweed is „the adventious species native to North America". It is considered to be naturally spread in Mexico and the North America, from Canada all over the USA to Texas (Nikolić et al., 2014). Šoljan et al. (2003) mention it as the neophyte native to America. Šilić and Abadžić (2000) point out that ragweed occurs in various crops, and it could also be found in ruderal habitats. Pišek et al. (2012) classify it as an accidental plant. According to Richardson et al. (2000) and Pišek et al. (2004), ragweed is a naturalized invasive species. Many authors, such as Kaczinski et al. (2008), Leru et al. (2015) and Maksimović (1990), have studied the influence this plant has on human health, through its polen which is extremely allergenic and causes serious health problems. Some authors have also studied its influence on animal health, such as Ognjenović et al. (2013). Vojniković (2009) puts ragweed on „The Black List of Flora in BiH", and Maslo (2016) onto the „Preliminary list of invasive alien plant species (IAS) in Bosnia and Herzegovina". After it was first recorded in 1940 in Osojci near Derventa (Malý 1940), it spread significantly all over Bosnia and Herzegovina. After that, Slavnić (1960) points out that it took 20 years for the next finding. The majority of authors noted ragweed in the area of Sarajevo. These are: Slavnić (1960) – the first ever ragweed find for the city of Sarajevo, Maksimović (1990), Tanović (1995), Tanović-Hadžiavdić and Šoljan (2006), Šoljan and Muratović (2000, 2002), Bašić (2012), Mujaković et al. (2015), Suljić (2015), Sarajlić and Jogan (2017) and Sarajlić et al. (2019). Memišević Hodžić et al. (2015) create a digital map of ragweed's sites for the Sarajevo Canton, and they provide the coordinate data for 9 municipalities on its distribution.

Unfortunately, phytocoenology of ragweed in BiH is poorly researched. Šumatić (1990) singles out *Ambrosiosum artemisiifoliae* facies within the *Panico-Galinsogetum* association. Mitrić (2004) in the orchards from Gradačac to Prijedor, and Kovačević (2008) in vineyards from Prnjavor to Prijedor also single out this facies. Šumatić (1997) points out that ragweed has the highest cover values in the *Panico-Galinsogetum parviflorae* association in the corn crop of the Pannonian Basin of Republika Srpska. Petronić and Milić (2007) observed it in the composition of the following associations from Pale area: *Polygonetum avicularis*, *Lolio-Plantaginetum majoris* subass. *sisymbietosum* and *Polygono-Bidentatum tripartite.* Redžić (2009) gives an overview and connections in which this species can be found, such as: *Bidention tripartiti*, *Salicion albae*, *Alnion glutinosae*, *Polygono-Chenopodion*, *Panico-Setarion, Sisymbrion*, *Onopordion acanthii*, *Onopordion illyricae*, *Artemision absinthi*, *Agrostion albae* and *Agropyro-Rumicion*. Kovačević et al. (2015) recorded it in the vineyards, in the weed association of *Cynodono-Sorghetum halepensae*, while Čekić et al. (2018) documented it in a series of associations in the class *Stellarietea mediae* in Lijevče polje.

Finally, it should be added that „weed flora and weed vegetation represent an extraordinary happy object for the biological studies" Slavnić (1956).

MATERIAL AND METHODS

The location of the research area is in a city zone 31-32° E and 57-58° N. When it comes to ragweed, this is one the most severely affected part of Sarajevo. Located in the municipality of Novo Sarajevo, it occupies the area of former railway freight and customs terminal. Ragweed is significantly widespread here for a number of reasons. One of the main ones is that, due to the vicinity of several shoping centers, transport truck and railway traffic has increased with a much wider range of places from where railway compositions come from compared to passenger compositions. Such neglected habitats with a strong antropogenic influence and without any special strategy for ragweed removal could be the most dangerous place during the summer and autumn for people suffering from allergies.

Due to the presence of several shopping centres in the vicinity, fluctuation of people in this area has increased. The traffic nearby is also well developed. Densely populated settlements are also close to it, so it is so unbelievable that there is no regulation of ragweed in this area. Ragweed here inhabits ruderal ecosystems of the *Chenopodietalia* order.

It should be pointed out that this site is not mentioned at the „Report on the implementation of the plan for educating the public, destroying and combating the spread of ragweed in the Federation of BiH" (Đurić, 2020) by the Federal Ministry of Environment and Tourism, though this area has been the source of pollen for over 15 years and the place from where ragweed spreads further.

The climatic type is designated as Cfb, which denotes a moderately warm and rainy climate with a warm summer and no dry period (Đug et al., 2008). Drešković (2003) points out that this means the mean monthly temperature of the hottest month is 15-22˚C, and that at least four months have a mean temperature of ≥ 10˚C. The average monthly temperature of the coldest month is always > -3.0˚C, the annual temperature amplitude ranges 12-22˚C, annual rainfall ranges 700-1200 mm of evenly distributed precipitation. Milosavljević (1970) puts this area into the zone with „the mean number of days with frost in the growing season (March-October), that is 21-30, and with a maximum number of days with frost in a period when the vegetation has the most abundant character (in May), that is 3-4 days".

The slope is even, the geological surface consists of tertiary lake sediments (Čičić, 2000), as far as tectonics is concerned, according to Čičić (1984), this area belongs to the transition zone. According to Đug et al. (2008), the morphogenetic relief type of the research area belongs to the fluvio-accumulative form – 2 class. The land is deposol, which, according to Škorić et al. (1973) belongs to the anthropogenic soils.

Chemical soil analysis were performed: pH (H_2O), pH (KCl), humus (%), P_2O_5 and K_2O (mg 100^{-1}). A pH meter (ISO 10390) was used to determine the pH value. The humus content in the soil was determined by the dichromate method (ISO 14235), the reading was performed on a Thermo Spectronic Genesys 20 spectrophometer, the content of easily accessible forms K and P in the soil samples was determined by amonium lactate (AL) method (Egner et al., 1960), P content was determined on a Thermo Spectronic Genesys 20 spectrophometer, and K on a Microprocessor Flame photometer 671 Labtronics.

Phytocoenological recording was done with all relevant parameters, such as: indicator value, floral element, life form and phytocoenological affiliation. Indicator values are provided according to Pavlović-Murarspahić (1995), life form by Raunkiaer (1937), floral element by Nikolić et al. (2014) and Oberdorfer (2001), and phytocoenological affiliation according to: Oberdorfer (2001) and Redžić (1988, 1991).

Latin plant names are provided according to the websites www.theplantlist.org and „Flora Croatica database".

The aim of the paper is to present the places in which ragweed occurs, other species it occurs with, as well as the ecological conditions under which it appears. The research was conducted in the period from 2021 to 2023.

Area of the former freight and customs terminal. Phytocoenological survay 1 (Map 1) is located between the rails and besides some deposol, where the stone from the railway tracks dominates. In such a place, unfavorable for plants, ragweed has spread significantly and it covers the majority of space.

Other plants appear in a significantly smaller number. On the other hand, phytocoenological survay 2 (Map 2) is located between the rails, and it is even more unfavorable for plant development, as there is little space and soil. *Stenactis annua* dominates in this relevé, while ragweed also has high cover values. Phytocoenological survay (Map 1 and 2) is located between the rails and paved surfaces. The habitat is very unfavorable, but even here a certain number

Map 1. Postition of the study area: Topographic map 1 : 25 000 Sarajevo-525-2-4 (taken from Military geographic institute Belgrade, 1986)

Karta 1. Položaj istraživanog područja: Topografska karta 1 : 25 000 Sarajevo-525-2-4 (preuzeto od Vojnogeografskog instituta Beograd, 1986)

Map 2. Positions of investigated localities in the Canton of Sarajevo
Karta 2. Pozicija istraživanih lokaliteta u Kantonu Sarajevo

of plants have found space for development. Ragweed dominates among them, followed by *Chenopodium album* with a smaller number of individuals. Other habitats are not so extreme, so that a larger number of species can be found in them. All of them have in common that they grow on deposol and that the anthropogenic influence is very high.

Anthropogenic influence is noted here also due to the fact that, at the end of April, authority services treated the vegetation next to the rails with herbicides, thus destroying the weed species. However, this leads to the smooth development of ragweed, which usually occurs much later in this area, during July. This may be one of the reasons for the large abundance of ragweed in this area.

RESULTS AND DISCUSSION

A total of 69 species from 23 families were identified (Table 1). The most common plants are: *Ambrosia artemisiifolia*, *Setaria viridis*, *Digitaria sanguinalis*, *Erigeron canadensis*, *Chenopodium album* and *Diplotaxis muralis*.

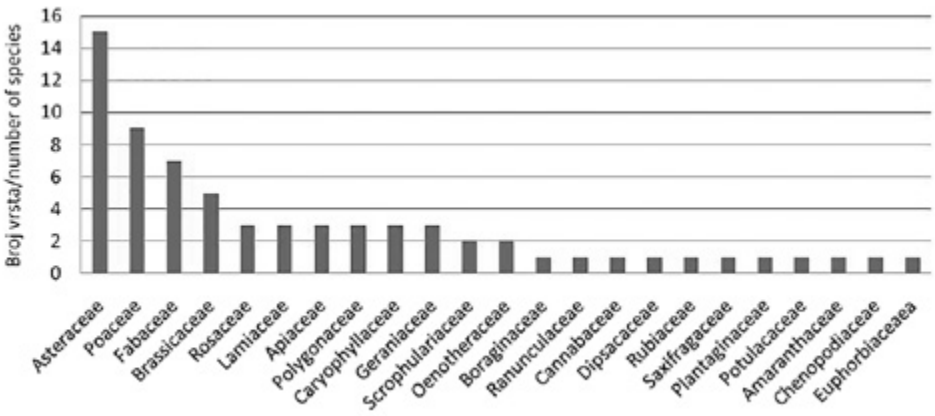

Figure 1. The number of families in the study area
Grafik 1. Broj familija u istraživanom području

The most species belonging to *Asteraceae* family (15), while *Poaceae, Fabaceae* and others have slightly lower numbers (Figure 1).

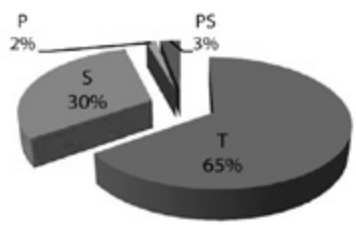

Figure 2. The ratio of indicator values in the studied vegetation
Grafik 2. Odnos vrednosti indikatora u proučavanoj vegetacije

It is clear from Figure 2 that representatives of tertiary vegetation are the most numerous, which can be attributed to the anthropogenic habitat. Though they are very close, representatives of secondary ecosystems have a much lower percentage. This brings us to the conclusion that the anthropogenic influence is very strong.

Table 1. Phytocoenologocal table of the studied vegetation
Tabela 1. Fitocenološka tabela istraživane vegetacije

Lokality	**Sarajevo-The area of the former freight and custom terminal**										
Lokalitet	**Sarajevo – prostor nekadašnjeg teretnog i carinskog terminala**										
Altitude (m)	531 m										
Geological basis	Tertiary lake sediments										
Soil type	Deposol										
General coverage (%)	80	80	60	90	100	100	80	80	90	90	80
Image size (m²)	30	30	20	50	50	50	30	50	50	50	50
Date	15. Septembar 2022.										
Image number	1	2	3	4	5	6	7	8	9	10	11
Phytocenosys	**Ordo *Chenopodietalia***										
Floristical composition:											
Herbaceous plants layer:											

	Abundancy and coverage											**I. v.**	**Floral element**	**L. f.**	**P. a.**
Ambrosia artemisiifolia L.	3.3	1.1	2.2	+2	+2	2.2	+2	1.1	+2	3.3	+2	T	n-am	T	Che.
Draba verna L.	+2	1.1	1.1	+2	+2		+2	+2				T	euras-med	T(H)	Che.
Setaria viridis P. B.	+2	1.1	+2	+2	3.3	3.3	3.3	1.1	3.3	3.3	3.3	T	euras-med	T	Che.
Artemisia vulgaris L.	+2	1.1					+2				+2	T	eurassubozean	Ch(H)	Art.
Linaria vulgaris Mill.	+2	1.1										T	euras(-smed)	H(G)	O.
Digitaria sanguinalis Scop.	+2	+2		1.1	3.3	3.3	2.2		3.3	3.3	+2	T	med-smed(euras), circ	T	Che.
Nasturtium officinalle R. Br.	+2	+2		+2	+2							T	subatl-smed	H	Che.
Arabidopsis thaliana (L.) Heynh.	+2	+2		+2	+2							T	smed-euras(subozean)	T(H)	O.
Avena fatua L.	+2	+2										T	med	T	Che.
Daucus carota L.	+2	+2										T	eurassubozean-smed	H	Arr.
Medicago lupulina L.	+2	+1		+2	+2							S	euras-smed	H(T)	B. e.
Oenothera bienis L.	+2	+1				+1						T	n-am	H	O.
Erigeron canadensis L.	+2		+2	+2	3.3	2.2	+1	+2	+2	+2	+2	T	n-am	T(H)	Che.
Geranium robertianum L.	+2		+2		+2	+2						P	eurassubozean-smed	H(T)	F.
Galium mollugo L.	+2			+2								S	smed	H	Arr.
Clematis vitalba L.	+2					+1	+1					PS	smed-subatl(circ)	P	P. s.
Rubus plicatus Weihe & Nees	+2					+1						PS	(no-)subatl(-smed)	P	P. s
Taraxacum officinalis Web. in Wigg.	+2							+2				S	no-euras(subozean)	H	Arr.
Humulus lupulus L.	+2											T	euras-smed,circ	H	Che.
Dipsacus sylvestris Huds.	+2											T	smed-med	H	Art.
Sonchus oleraceus L.	+2											T	euras-smed-med	T(H)	Che.
Tussilago farfara L.	+2											T	no-euras-smed	G(H)	Che.
Solidago canadensis L.	+2											T	n-am	H	O.
Epilobium parviflorum Schreb.	+1	+2										T	eurassubozean	H(Ch)	Art.
Chenopodium album L.	+1		1.1	3.3	1.1	1.1	+2	+2	2.2	1.1	+2	T	no-euras(-med)	T	Che.
Stenactis annua (L.) Cass.		3.3	+2					+2			+2	T	n-am	H	Che.

Plantago lanceolata L.	1.1	+1					+2				S	eurassubozean	H	Arr.
Pastinaca sativa L.	1.1				+1					+2	S	euras-smed	H	Arr.
Ononis spinosa L.	1.1										S	smed	H(Ch)	B. e.
Verbascum thapsus L.	+2	+1	+2				+1				T	euras-smed	H	O.
Arenaria serpyllifolia L.	+2		+2	+2							T	euras-med, circ	T	Che.
Echium vulgare L.	+2			+2			+2			+2	T	euras-smed	H	O.
Lotus corniculatus L.	+2										S	eurassubozean-smed	H	Arr.
Diplotaxis muralis (L.) DC.	+1	+2	2.2	+2			1.1		+2		T	med-smed	T	O.
Sanguisorba minor Scop.	+1										S	smed	H	B. e.
Cichorium intybus L.	+1										T	eurassubozean-smed	H	Che.
Polygonum aviculare L.	+1		+2								T	med-euras-no	T	Che.
Poa annua L.		+2		1.1	2.2					1.1	T	no-euras-med	T(H)	Che.
Senecio vulgaris L.		+2		+2						+2	T	med-euras	T(H)	Che.
Geranium molle L.		+2			+2						S	med-smed(-subatl)	T	Arr.
Lamium purpureum L.		+2									T	(no-)euras-smed	T(H)	Che.
Medicago sativa L.			1.1	+2		+2					S	pers.	H	Arr.
Poa pratensis L.			1.1				+2				S	euras(kont)(-smed)	H(G)	Arr.
Amaranthus retroflexus L.			+2	+2				1.1		+2	T	kont-med	T	Che.
Portulaca oleracea L.			+2	+2				+2			T	(o)med-smed	T	Che.
Silene vulgaris (Moench) Garcke			+2				1.1				S	no-euras-smed	H(Ch)	B. e.
Achillea millefolium L.			+2							+2	S	no-eurassubozean	H	Arr.
Apera spica-venti (L.) P. B.				1.1			+2	3.3	3.3	3.3	T	euras	T	Che.
Erodium cicutarium (L.) L'Herit.				+2					+2		T	med-euras	T(H)	Che.
Saxifraga tridactylites L.				+2							T	med-smed	T	Che.
Hordeum murinum L.					+2						T	smed-med	H	Che.
Euphorbia maculata L.						+2			+2		T	n-am	T	Che.
Dactylis glomerata L.							1.1				S	euras(-smed)	H	Arr.
Potentilla argentea L.							1.1				S	smed-euras	H	B. e.
Trifolium repens L.							+2		+2	+2	S	eurassubozean-smed	H(Ch)	Arr.
Tragopogon pratensis L.							+2		+2	+1	S	subatl	H	Arr.
Melilotus albus L.							+2			+1	T	euras(kont)(-smed)	H(T)	Che.
Pimpinella saxifraga L.							+2				S	(no-)eurassuboz-smed	H	B. e.
Lolium perenne L.							+2				S	subatl-smed	H	Arr.
Mentha longifolia (L.) Huds.							+2				S	smed-euras	H	Mol.
Ballota nigra L.								+2	+2		T	osmed-gemässkont	H(Ch)	Che.
Fallopia convulvulus (L.) Á. Löve								+2	+2		T	(no-)euras	T	Che.
Rumex acetosa L.									+2		S	no-euras, circ	H	Arr.
Matricaria chamomilla L.										+2	T	eurassubozean(-smed)	T	Che.
Artemisia absinthium L.										+2	T	euraskont(-smed)	Ch(H)	Art.
Cirsium arvense (L.) Scop.										+2	T	no-euras-smed	G	Che.
Melandrium album (Mill.) Garcke										+2	T	euras-smed	T	Art.
Melilotus officinalis (L.) Pall.										+1	T	eurassubozean(-smed)	H	O.
Capsella bursa-pastoris (L.) Med.										+1	T	med(-kont)	T(H)	Che.

Table 2. Chemical characteristics of soil
Tabela 2. Hemijske karakteristike zemljišta

Parameter Parametar	Number of sample / Broj uzoraka										
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
pH(H_2O)	7,21	7,19	7,01	7,25	7,26	7,43	7,72	7,30	7,76	7,78	7,76
pH(KCl)	6,80	7,18	7,00	6,86	7,11	7,35	7,11	6,52	7,41	7,20	7,38
Hummus (%)	15,47	13,35	11,52	17,96	16,93	11,59	15,69	16,73	10,55	17,22	10,19
Phosphor (P_2O_5) (mg 100 g^{-1})	16,34	69,31	51,78	15,62	99,67	33,01	14,38	15,54	23,66	50,76	23,37
Potassium (K_2O) (mg 100 g^{-1})	22,3	35,2	22,8	17,4	23,0	12,5	17,4	10,0	35,7	35,7	12,6
Reactions	neutral	neutral	neutral	neutral	neutral	alkaline	alkaline	neutral	alkaline	alkaline	alkaline
Hummus content	very hummus soil	very hummus soil	very hummus soil	very hummus soil	very hummus soil	very hummus soil	very hummus soil	very hummus soil	very hummus soil	very hummus soil	very hummus soil
Supply with P	very richly supplied	very richly supplied	very richly supplied	very richly supplied	very richly supplied	very richly supplied	very richly supplied	very richly supplied	very richly supplied	very richly supplied	very richly supplied
Supply with K	richly supplied	richly supplied	richly supplied	moderately supplied	richly supplied	moderately supplied	moderately supplied	poorly to moderately supplied	richly supplied	richly supplied	moderately supplied

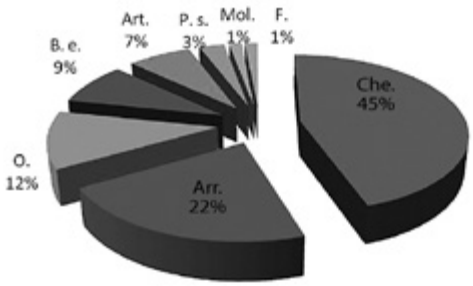

Figure 3. Ratio of the phytocenological order abundance in the studied vegetation
Grafik 3. Odnos broja fitocenoloških redova u proučavanoj vegetaciji

It is seen from the Figure 3 that the largest number of species belongs to the *Chenopodietalia* order. Of the others, the *Arrhenatheretalia* order of secondary mesophilic meadows stands out. This does not come as a surprise, because the meadows of this vegetation are located in the immediate vicinity of the studied locality. A much smaller number of species belongs to other orders. In total, species from 8 orders have been observed.

It is evident from Table 3 that the majority of plants belong to hemicryptophytes, but there is also a large percentage of therophytes, which shows that the study area is inhabited by a high number of weed species. Such a ratio of life forms, as well as other parameters, shows that the study area is under considerable anthropogenic influence.

A total of 41 various floral elements from 9 groups were noted (Table 4). The highest number of species in the study area belongs to the group of Eurasian floral element. As for the individual floral element, the largest number of species is observed for the euras-smed and eurassubozean-smed floral element (5). Interesting data are that even six neophytes from North America were identified in the study area.

It can be seen from Table 2 that the maximum pH (H_2O) value is 7.78 and pH (KCl) 7.41, so that the pH value at the study site shows neutral to alkaline reaction. The higest percentage of humus is 17.96 and all the measured footages have very humus soil. The largest amount of P is even 99.67, so soils from all samples are very richly supplied with the same. On the other hand, the largest amount of K is 33.7 and the supplyability ranges from poor to richly suplied footages.

It should be emphasized that ragweed does not occur in this area in places close to the study area, and belongs to the vegetation of secondary meadows of the *Arrhenatheretalia* order. In these areas, a competitive defense system of members of this vegetation is obviously well developed, which prevents the penetration of ragweed. It is obvious that ragweed has no chance for its development in somewhat more stable ecosystems, even if they are secondary ones.

Table 3. The ratio of life forms in the studied vegetation
Tabela3. Udeo životnih formi u proučavanoj vegetaciji

Life form Životna forma	Total number Ukupan broj	Total Ukupno	%	Σ %
H	27		39.10	
H(Ch)	5		7.24	
H(G)	2		2.89	
H(T)	3		4.34	
		37		53.63
P	2		2.89	
		2		2.89
G	1		1.44	
G(H)	1		1.44	
		2		2.89
Ch(H)	2		2.89	
		2		2.89
T	17		24.62	
T(H)	9	26	13.04	37.67
Total	69	69	100 %	100 %

Table 4. The spectrum of floral elements in the studied vegetation
Tabela 4. Spektar flornih elemenata u pručavanoj vegetaciji

		Floral element Florni element	Established number in the research area Utvrđen broj u istraživanom području	Σ	Percentage of participation Procenat učešća	Total % Ukupno %
1.		smed	3		2.07	
2.		smed-med	2		1.38	
3.	1.	smed-subatl(circ)	1	10	0.69	14.49
4.		smed-euras	2		1.38	
5.		smed-euras(subozean)	1		0.69	
6.		osmed-gemässkont	1		0.69	
7.		(o)med-smed	1		0.69	
8.		med	1		1.38	
9.		med-smed	2		1.38	14.49
10.	2.	med-smed(-subatl)	1	10	0.69	
11.		med-smed(euras), circ	1		0.69	
12.		med-euras	2		1.38	
13.		med-euras-no	1		0.69	
14.		med(-kont)	1		0.69	
15.		subatl	1		0.69	
16.	3.	(no-)subatl(-smed)	1	4	0.69	2.76
17.		subatl-smed	2		1.38	
18.		euras	1		0.69	
19.		(no-)euras	1		0.69	
20.		euras-smed	5		3.45	
21.	4.	euras-smed,circ	1	17	0.69	
22.		(no-)euras-smed	1		0.69	
23.		euras(-smed)	2		1.38	
24.		euras-smed-med	1		0.69	

25.		euras-med	2		1.38	
26.	4.	euras-med, circ	1	17	0.69	
27.		euras(kont)(-smed)	2		1.38	
28.		no-euras, circ	1		0.69	
29.		no-euras-smed	3			
30.	5.	no-euras-med	1	8	0.69	
31.		no-euras(-med)	1		0.69	
32.		no-euras(subozean)	1		0.69	
33.		no-eurassubozean	1		0.69	
34.		eurassubozean	3		2.07	
35.		eurassubozean-smed	5		3.45	7.95
36.	6.	eurassubozean(-smed)	2	11	1.38	
37.		(no-) eurassubozean-smed	1		0.69	
38.	7.	euraskont(-smed)	1	2	0.69	1.38
39.		kont-med	1		0.69	
40	8.	pers.	1	1	0.69	0.69
41	9.	n-am	6	6		
Total			69	69	100	100

CONCLUSION

These are new data on the phytocoenology of ragweed. It has been observed in the vegetation of the *Chenopodietalia* order. A total of 69 species from 23 families were identified in the vegetation. The most numerous is the *Asteraceae* family. As for the phytocoenological affiliation, the largest number of species belongs to the *Chenopodietalia* order. Of the indicator values, representatives of tertiary vegetation are the most numerous. Regarding the life forms, hemicryptophytes predominate. As for the floral element, 41 various elements from 9 groups were noted. The most numerous is the Eurasian group. The most numerous individual floral elements are euras-smed and eurassubozean-smed. Six neophytes originating from North America were also recorded. In conclusion, it has been observed that ragweed cannot spread in somewhat more stable ecosystems.

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Prilog fitocenologiji i ekološkim odnosima ambrozije (*Ambrosia artemisiifolia* L.) u Kantonu Sarajevo

REZIME

Ambrozija je štetan i opasan korov. To je neofita koja naseljava razne kulture i ruderalna staništa. Zbog toga je ovaj rad posvećen fitocenologiji i ekološkim odnosima ambrozije na jednom takvom staništu. Istraživanje je obavljeno na području nekadašnjeg željezničkog teretnog i carinskog terminala u periodu od 2021 do 2023. Ovo područje jedno od najopasnijih mjesta u Sarajevu po brojnosti i rasprostranjenosti ambrozije, i u blizini se nalaze tržni centri, kao i veći broj zgrada. Urađen je fitocenološki snimak te su obrađeni i svi ostali parametri: životna forma, fitocenološka pripadnost, florni elementi, indikatorske vrijednosti i analiza zemljišta.Cilj rada je predstaviti na kakvim mjestima se ambrozija javlja, sa kojim ostalim vrstama i pod kakvim ekološkim uslovima.

Ovim istraživanjem su dobijeni novi podaci o fitocenologiji ambrozije koja je utvrđena u vegetaciji reda *Chenopodietalia.* U vegetaciji je utvrđeno ukupno 69 vrsta iz 23 porodice. Najbrojnija porodica je *Asteraceae.* Fitocenološki, najveći broj vrsta pripada redu *Chenopodietalia,* od indikatorskih vrijednosti predstavnici tercijerna vegetacije su najbrojniji. U životnim formama preovladavaju hemikriptofite, od flornih elemenata konstatovano je 40 različitih elemenata iz 9 skupina, najbrojnija skupina je eurasijska a najbrojniji pojedinačni florni elementi su euras-smed i eurassubozean-smed. Konstatovano je 6 neofita sa područja Sjeverne Amerike

Ključne reči: fitocenologija, hemikriptofite, ambrozija, korovi, asocijacija, *Chenopodietal.*