

THE *VULPIA MYUROS* COMMUNITY IN CROATIA

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In this paper, the *Vulpia myuros* community is noted for the first time in inland Croatia. It has become established in ruderal habitats along railway tracks in skeletal and sandy soils. This is an annual, mainly therophytic community with a small number of species in its floristic composition, dominated by the grass *Vulpia myuros* (L.) C. C. Gmelin. Phytosociologically, it is assigned to ruderal vegetation of the order *Sisymbrietalia* J. Tx. in Lohm. et al. 1962 and the class *Chenopodietea* Br.-Bl. 1951.

Key words: *Vulpia myuros* community, ruderal vegetation, *Sisymbrietalia* J. Tx. in Lohm. et al. 1962, *Chenopodietea* Br.-Bl. 1951, Croatia

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U ovome radu je po prvi puta zabilježena zajednica vrste *Vulpia myuros* u kontinentalnoj Hrvatskoj. Utvrđena je na ruderalnim staništima uzduž željezničkih pruga na skeletnom i pjeskovitom tlu. To je jednogodišnja, uglavnom terofitska zajednica s malim brojem vrsta u flornom sastavu među kojima dominira trava *Vulpia myuros* (L.) C. C. Gmelin. Fitocenološki pripada ruderalnoj vegetaciji reda *Sisymbrietalia* J. Tx. in Lohm. et al. 1962 i razreda *Chenopodietea* Br.-Bl. 1951.

Ključne riječi: zajednica vrste *Vulpia myuros*, ruderalna vegetacija, *Sisymbrietalia* J. Tx. in Lohm. et al. 1962, *Chenopodietea* Br.-Bl. 1951, Hrvatska

INTRODUCTION

The grass *Vulpia myuros* (L.) C. C. Gmelin is widespread plant species in Europe (STACE & COTTON, 1980) as well as in Croatia (NIKOLIĆ, 2014).

In Europe, in the area of moderate continental climate, there are noted several plant communities characterised by *Vulpia myuros*.

First, OBERDORFER (1938, 1957) described a broadly understood community under the name *Filagini-Vulpietum* 1938, with several character species: *Vulpia bromoides* (L.) S. F. Gray, *V. myuros*, *Filago pyramidata* L., *Logfia arvensis* (L.) J. Holub and *Aira caryophyllea* L. The association is noted in Austria (MUCINA & KOLBEK, 1993), Denmark (DIERSSEN, 1996), Germany (KORNECK, 1993; GEHLKEN, 2010), Hungary (BORHIDI, 2003), Ireland (WHITE & DOYLE, 1982), Poland (MATUSZKIEWICZ, 2001), Slovakia (MAGLOCKÝ, 1978; VALACHOVIČ *et al.*, 1995) and Sweden (DIERSSEN, 1996).

Later, PHILIPPI (1973) divided the association *Filagini-Vulpietum* into several more narrowly understood communities: *Vulpietum myuri*, *Vulpia bromoides* community, *Filago pyramidata* community and stands of *Logfia arvensis*. As the reason for such separation, PHILIPPI (1973) notes different ecological conditions in the habitat. The association *Vulpietum myuri* Philippi 1973 is noted in Germany (PHILIPPI, 1973), the Czech Republic (KOLBEK *et al.*, 2001; SÁDLO, 2007) and Bulgaria (TZONEV *et al.*, 2009).

Recently, GEHLKEN (2010) has made a very detailed survey of *Vulpia myuros* communities, and according to his phytosociological analyses there is no evidence for a distinction between *Filagini-Vulpietum* and *Vulpietum myuri*. However, in the case of one broadly or two narrowly understood associations, both belong to the class *Koelerio-Corynephoretea* Klika in Klika et Novák 1941, which represents low-growing annual grasslands on porous substrate.

Furthermore, some authors (BRANDES, 1983; GEHLKEN, 2010) separate *Vulpia myuros* ruderal communities. Such communities have a considerable number of ruderal species and may be assigned to the order *Sisymbrietalia* J. Tx. in Lohm. et al. 1962 and the class *Chenopodietea* Br.-Bl. 1951.

In any case, all mentioned *Vulpia myuros* communities have common features. These are the low-growing vegetation, mostly poor in species (KORNECK, 1993) and recognisable by its dominant species, *Vulpia myuros*. In the floristic composition, therophytic plants are represented in a high proportion. Stands develop on sandy, gravelly and skeletal soils, which belong, from a soil-science point of view, to undeveloped soil with a small proportion of humus (KORNECK, 1993; DIERSSEN, 1996). According to some authors, the soil reaction is acidic (KORNECK, 1993; MUCINA & KOLBEK, 1993), but according to some others it is rich in bases (DIERSSEN, 1996). Habitats are exposed to moderate disturbance, and therefore these stands have bare soil patches in the vegetation cover (SÁDLO, 2007). The communities have the character of short-lived pioneer vegetation, and start their development after heavy spring precipitations (KORNECK, 1993), mostly in warmer places exposed to sunlight during the whole day (MUCINA & KOLBEK, 1993).

Habitats of *Vulpia myuros* and appertaining communities in the continental part of Europe are: surfaces along railway tracks, railway and other stations, margins of paths, surfaces near industrial facilities, sports grounds, airports, military complexes, cemeteries, dams, moderately trampled places, piles of gravel, abandoned excavations of sand and gravel, bottoms of former quarries, uncultivated fields, field edges, and sites of fire (KORNECK, 1993; MUCINA & KOLBEK, 1993; DIERSSEN, 1996).

In Croatia, along the Adriatic coast, in the area of the Mediterranean climate, there are noted the alliance *Vulpio-Lotion* Horvatić 1960 and the association *Ornithopodi-Vulpietum* Horvatić 1960, in the species composition of which grows the grass *Vulpia myuros*. Moreover, *Vulpia myuros* is one of the character species of the association *Ornithopodi-Vulpietum*. All communities from the alliance *Vulpio-Lotion* represent short-lived dry grassland vegetation. The association *Ornithopodi-Vulpietum* is known from the island of Lokrum (HORVATIĆ, 1963; HORVAT *et al.*, 1974), the islands of Badija and Koločep (HORVATIĆ, 1963), the surroundings of Dubrovnik (BIRAČ, 1971), and the island of Šipan (HEĆIMOVIĆ, 1980), while the other communities of the alliance *Vulpio-Lotion* are noted in the wider region of Mediterranean Croatia. However, it should be pointed out that, in the floristic composition of the communities mentioned, beside *Vulpia myuros* other species of the genus *Vulpia* also grow, as well as many grassland and ruderal species typical of the Mediterranean area. Therefore the alliance *Vulpio-Lotion* and the association *Ornithopodi-Vulpietum* (class *Thero-Brachypodietea* Br.-Bl. 1947) differ considerably from the continental communities, in which *Vulpia myuros* dominates. Moreover, continental and Mediterranean *Vulpia* communities are assigned to different vegetation classes (HORVAT *et al.*, 1974; KORNECK, 1993; GEHLKEN, 2010).

So far, in the phytosociological literature in continental Croatia (TRINAJSTIĆ, 2008), no community with the grass *Vulpia myuros* has been mentioned. Therefore, the main goal of this paper is to present the first record of a *Vulpia myuros* community in inland Croatia.

METHODS

Phytosociological field research was carried out during 2008. The relevés were done according to the Zürich-Montpellier methodology (HORVAT, 1949; BRAUN-BLANQUET, 1964). The species composition of the *Vulpia myuros* community in Croatia is shown in the analytical table, where the species are grouped after their phytosociological affinity in accordance with OBERDORFER (2001). Also, for better characterisation of the community, the analytical table gives life forms (ELLENBERG *et al.*, 1991) and floristic status (KLOTZ *et al.*, 2002) for every vascular plant taxon. A list of relevé localities is presented in Appendix 1, and community distribution on the map.

The nomenclature of plant species follows Flora Europaea (TUTIN *et al.*, 1964–1980, 1993).

RESULTS AND DISCUSSION

The *Vulpia myuros* community (Fig. 1, 2) was found in several localities along the railway tracks between Zabok station and the main Zagreb station in 2008 (Fig. 3). The species composition of the *Vulpia myuros* community is presented with nine relevés in the analytical table (Tab. 1).

The annual grass *Vulpia myuros* (Tab. 1) is dominant in species composition. In contrast to all other species, it is represented with high cover values.

Ruderal species are the most numerous in the community's species composition (Tab. 1). There are seven character species for the order *Sisymbrietalia* J. Tx. in Lohm. *et al.* 1962, among which the most frequent are: *Lepidium virginicum* L., *Bromus tectorum* L., *Hordeum murinum* L. and *Lactuca serriola* L. The order *Sisymbrietalia* belongs to the class *Chenopo-*



Fig. 1. *Vulpia myuros* community in habitat in Zabok on 29/05/2008, with green plants (relevé 2).



Fig. 2. *Vulpia myuros* community in habitat in Zagreb, main railway station, on 08/06/2008, with dry plants (relevé 9).

dietea Br.-Bl. 1951, which covers annual and biennial ruderal and weed vegetation. *Chenopodietea* is represented by eight species, the most frequent being: *Senecio vulgaris* L., *Viola arvensis* Murray and *Sonchus asper* (L.) Hill. Biennial and perennial ruderal vegetation of the class *Artemisietea vulgaris* Lohm., Prsg., et Tx. in Tx. 1950 is represented by six species, among which the most frequent are: *Picris hieracioides* L. and *Erigeron annuus* (L.) Pers.

Species of trampled habits are represented by five species. Moderate influence of trampling is evident in relevés 1 and 2 (Tab. 1).

The character species of the class *Koelerio-Corynephoretea* are represented by six taxa, among which the most frequent is *Arenaria serpyllifolia* L. s. l.

Nine perennial grassland species characteristic of the class *Molinio-Arrhenatheretea* Tx. 1937 are also found, but they are not frequent or abundant.

The group of companions is represented only by five plant taxa which have small cover values.

Moss flora is recorded collectively, without identification of species. It covers up to 25% of the surface.

Juvenile plants are also recorded, and they include mostly grass species.

In general, stands are poor in species, which number between 10 and 20 vascular plant taxa per relevé. Relevés were done over an area of 6–9 square metres. Across all nine relevés, the total number of vascular plant taxa amounts to 47.

The community has a relatively short life cycle. It is recognisable at the end of May and the beginning of June; after that, the plants dry off and mostly disappear. All recorded stands had developed on flat surfaces, in skeletal and sandy soils, along railway

Life forms	Floristic status	Relevé number	1	2	3	4	5	6	7	8	9	Taxa frequencies
		Relevé area (m ²)	6	6	6	6	9	8	8	6	8	
		Relevé shape	4×1,5	4×1,5	4×1,5	4×1,5	3×3	8×1	8×1	4×1,5	8×1	
		Cover total (%)	95	80	50	40	90	60	80-90	95	90	
		Altitude (m)	144	144	130	128	128	125	125	120	120	
		Number of vascular plant taxa	11	13	14	15	14	14	13	20	10	
Koelerio-Corynepherea Klika in Klika et Novák 1941												
T, C	I	<i>Arenaria serpyllifolia</i> L. s. l.	.	+	2	1	2	2	1	1	.	7
T	A	<i>Veronica arvensis</i> L.	r	.	.	.	.	.	.	r	1	3
T, H	I	<i>Cerastium semidecandrum</i> L.	r	.	.	.	r	.	.	.	.	2
T, H	A	<i>Arabidopsis thaliana</i> (L.) Heynh.	.	.	.	.	.	.	.	r	.	1
T, H	I	<i>Erodium cicutarium</i> (L.) L. Hér.	.	.	.	1	.	.	.	.	.	1
C	I	<i>Petrorhagia saxifraga</i> (L.) Link	.	.	.	.	.	r	.	.	.	1
Molinio-Arrhenatheretea Tx. 1937												
H	I	<i>Leontodon taraxacoides</i> (Vill.) Mérat	r	1	.	.	+	.	.	.	.	3
T, H	I	<i>Medicago lupulina</i> L.	.	.	.	.	+	r	.	.	1	3
		<i>Crepis</i> sp.	.	r	.	.	.	+	.	.	.	2
H	I	<i>Leontodon hispidus</i> L. ssp. <i>hispidus</i>	.	.	.	.	.	2	+	.	.	2
H	I	<i>Dactylis glomerata</i> L.	.	.	r	.	.	.	.	.	.	1
H	I	<i>Hypochoeris radicata</i> L.	.	.	.	.	.	.	.	r	.	1
H	I	<i>Leontodon hispidus</i> L. ssp. <i>danubialis</i> (Jacq.) Simonk.	.	.	.	.	.	.	2	.	.	1
H	I	<i>Plantago lanceolata</i> L.	.	.	.	.	.	.	.	.	r	1
H, G	I	<i>Poa pratensis</i> L.	.	.	r	.	.	.	.	.	.	1
Companions												
H	I	<i>Taraxacum officinale</i> agg.	.	.	+	r	.	.	.	.	.	2
		<i>Anagallis</i> sp.	.	.	.	.	.	.	.	+	.	1
		<i>Bromus</i> sp.	.	.	.	.	r	.	.	.	.	1
H	I	<i>Chondrilla juncea</i> L.	.	.	.	.	.	.	r	.	.	1
H	I	<i>Lactuca viminea</i> (L.) J. et C. Presl	.	.	.	.	r	.	.	.	.	1
		Moss flora coll.	.	.	1	2	1	2	+	1	1	7
		Juvenile plants	.	.	1	.	1	2	1	1	.	5

tracks, in the vicinity of railway stations. Altitudes range between 120 and 144 m a.s.l. (Tab. 1). The community shows the structure of sparse and low grassland (up to 20 cm high), often with bare patches of soil. Cover values of the stands range between 40% and 95% (Tab. 1).

Analysis of plant life forms shows that hemicytopytes prevail, with 28 taxa (65%), and therophytes, with 25 taxa (60%). Geophytes and chamaephytes are represented by 2 taxa each (5%) (Tab. 1). It should be emphasised that some plant taxa have two affiliated life forms, and therefore the sum of percentage values exceeds 100%.



Fig. 3. Distribution map of the *Vulpia myuros* community in northern Croatia.

Concerning the floristic status (Tab. 1), there are 27 (63%) indigenous plant taxa, 10 (23%) archaeophytes and 6 (14%) neophytes. Such proportions correspond to ruderal vegetation.

The community develops in habitats with moderate disturbance factor, which enables the continuous renewal of *Vulpia myuros*, a species typical of ruderal habitats and neophytes. If the disturbance of the surface soil level ceases, after some time perennial species appear. Some authors (SÁDLO, 2007; GEHLKEN, 2010) note moderate trampling as the disturbance factor in *Vulpia myuros* communities. PHILIPPI (1973) cites sheep pasture. In Croatia, however, it seems that trampling and pasture are not crucial disturbance factors. In their stead, surfaces along railway tracks are treated with herbicides every year in order to prevent overgrowing by perennial and woody plants which could obstruct traffic. Such chemical treatments usually take place in June or later, at a time when the community has finished its annual developmental cycle. The plants release their seeds before the treatment, and the harmful effects of the herbicides are lost until next year. It seems that the application of herbicides ensures the survival of the community in its habitats. Application of herbicides is also mentioned in the figure description in the work from the Czech Republic (SÁDLO, 2007).

Concerning the syntaxonomic affiliation of the community described in this paper, it cannot be classified under the class *Koelerio-Corynephoretea* Klika in Klika et Novák 1941, as in the case of associations *Filagini-Vulpietum* and *Vulpietum myuri*, because of the lack of character species of this class (Tab. 1). On the contrary, the community has a high proportion of ruderal species, especially from the class *Chenopodietea* Br.-Bl. 1951. Therefore, the community is classified according to GEHLKEN (2010) as follows:

Class: *Chenopodietea* Br.-Bl. 1951
 Order: *Sisymbrietalia* J. Tx. in Lohm. et al. 1962
 Alliance: *Sisymbriion* Tx. et al. in Tx. 1950
Vulpia myuros community

From the standpoint of nature conservation, the *Vulpia myuros* community in Croatia could not be considered as endangered. Stands have been successfully maintained in habitats several years in succession, i.e. since they were found for the first time in Croatia. Also, no taxa are found from the list of the Red Book of Vascular Flora of Croatia (NIKOLIĆ & TOPIĆ, 2005) or the Bern Convention (ANONYMOUS, 1979) or Species Directive (ANONYMOUS, 1992). However, the record of a *Vulpia myuros* community represents a contribution to the knowledge of ruderal vegetation and its biodiversity in Croatia.

Since the whole territory of Croatia is well connected with railway tracks, the finding of new localities of the community can be expected during future investigations.

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REFERENCES

- ANONYMOUS, 1979: Strictly protected flora species. Appendix to the Bern Convention, Bern.
- ANONYMOUS, 1992: Annex II. Animal and plant species of community interest whose conservation requires the designation of special areas of conservation. In: ANONYMOUS, Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and wild fauna and flora. The Council of the European Communities.
- BIRAČ, V., 1971: Biljni pokrov Srđa i okolice Dubrovačke Rijeke. Magistarski rad. Prirodoslovno-matematički fakultet, Sveučilište u Zagrebu, Zagreb.
- BORHIDI, A., 2003: Magyarország növénytársulásai. Akadémiai Kiadó, Budapest.
- BRANDES, D., 1983: Flora und Vegetation der Bahnhöfe Mitteleuropas. Phytocoenologia 11 (1), 31–115. Stuttgart/Barunschweig.
- BRAUN-BLANQUET, J., 1964: Pflanzensoziologie. 3th ed., Springer Verlag, Wien-New York.
- DIERSSEN, K., 1996: Vegetation Nordeuropas. Ulmer, Stuttgart.
- ELLENBERG, H., H. E. WEBER, R. DÜLL, V. WIRTH, W. WERNER & D. PAULISSEN, 1991: Zeigerwerte von Pflanzen in Mitteleuropa. Scripta Geobot. 18, 1–248. Göttingen.
- GEHLKEN, B., 2010: Beitrag zur Abgrenzung und Untergliederung des *Filagini-Vulpietum myuros* Oberd. 1938. Tuexenia 30, 271–288. Göttingen.
- HEĆIMOVIĆ, M., 1980: Biljni pokrov otoka Šipana. Magistarski rad. Prirodoslovno-matematički fakultet, Sveučilište u Zagrebu, Zagreb.
- HORVAT, I., 1949: Nauka o biljnim zajednicama. Nakladni zavod Hrvatske, Zagreb.
- HORVAT, I., V. GLAVAČ, & H. ELLENBERG, 1974: Vegetation Südosteuropas. Geobotanica Selecta Bd. IV. Gustav Fischer Verlag, Stuttgart, p. 143–144, 208–211.
- HORVATIĆ, S., 1963: Vegetacijska karta otoka Paga s općim pregledom vegetacijskih jedinica Hrvatskog primorja. Prir. Istraž. Jugosl. Akad. 33. Acta biol. 4, 5–187.
- KLOTZ, S., I. KÜHN & W. DURKA (eds), 2002: BIOLFLORE – Eine Datenbank mit biologisch-ökologischen Merkmalen zur Flora von Deutschland. Bundesamt für Naturschutz, Bonn.
- KOLBEK, J., Z. NEUHÄUSLOVÁ, J. SÁDLO, J. DOSTÁLEK, P. HAVLIČEK, J. HUSÁKOVÁ, T. KUČERA, Z. KROPÁČ & S. LECJAKSOVÁ, 2001: Vegetace Chráněné krajinné oblasti a Biosférické rezervace Křivoklátsko 2. Společensva skal, strání, sutí, primitivních půd, vřesovišť, termofilních lemů a synantropní vegetace. Academia, Praha.
- KORNECK, D., 1993: Klasse: *Sedo-Scleranthetea* Br.-Bl. 55 em. Th. Müller 61. In: OBERDORFER, E. (ed.), Süddeutsche Pflanzengesellschaften. Teil II: Sand- und Trockenrasen, Heide- und Borstgrasgesellschaften, alpine Magerrasen, Saum-Gesellschaften, Schlag- und Hochstauden-Fluren. 3th ed. Gustav Fischer Verlag, Jena/Stuttgart/New York, p. 13–85.

- MAGLOCKÝ, Š., 1978: *Filagini-Vulpietum* Oberd. 1938 in den Kleinen Karpaten. Acta bot. Slov. Acad. Sci. Slovaca, ser. A 3: 299–304. Bratislava.
- MATUSZKIEWICZ, W., 2001: Przewodnik do oznaczania zbiorowisk roślinnych Polski. Wydawnictwo Naukowe PWN, Warszawa.
- MUCINA, L. & J. KOLBEK, 1993: *Koelerio-Corynephoretea*. In: MUCINA, L., G. GRABHERR & T. ELLMAUER (eds.), Die Pflanzengesellschaften Österreichs. Teil 1. Anthropogene Vegetation. Gustav Fischer Verlag, Jena-Stuttgart-New York, p. 297–401.
- NIKOLIĆ, T. & J. TOPIĆ (eds.), 2005: Crvena knjiga vaskularne flore Republike Hrvatske: kategorije EX, RE, CR, EN i VU. Državni zavod za zaštitu prirode, Ministarstvo kulture, Zagreb.
- NIKOLIĆ, T. (ed.), 2014: Flora Croatica Database (URL <http://hirc.botanic.hr/fcd>). Prirodoslovno-matematički fakultet, Sveučilište u Zagrebu, Zagreb.
- OBERDORFER, E., 1938: Pflanzensoziologische Beobachtungen und floristische Neufunde im Oberrhein-gebiet. Verh. Naturhist.-Med. Vereins Heidelberg 18, 183–201. Heidelberg.
- OBERDORFER, E., 1957: Süddeutsche Pflanzengesellschaften. Pflanzensoziologie 10, 1–564. Jena.
- OBERDORFER, E., 2001: Pflanzensoziologische Exkursionsflora für Deutschland und angrenzende Gebiete. 8th ed. Verlag Eugen Ulmer, Stuttgart.
- PHILIPPI, G., 1973: Sandfluren und Brachen kalkarmer Flugsande des mittleren Oberrheingebietes. Veröff. Landesstelle Naturschutz Landschaftspfl. Baden-Württemberg 41, 24–62. Karlsruhe.
- SÁDLO, J., 2007: *Vulpietum myuri* Philippi 1973. In: CHYTRÝ, M. (ed.), Vegetace České republiky. Travinná a keříčková vegetace. Vegetation of the Czech Republic. 1. Grassland and Heathland Vegetation. Academia, Praha, p. 341–343.
- STACE, C. A. & R. COTTON, 1980: *Vulpia*. In: TUTIN, T. G., V. H. HEYWOOD, N. A. BURGESS, D. M. MOORE, D. H. VALENTINE, S. M. WALTERS & D. A. WEBB (eds.), Flora Europaea 5, Cambridge University Press, Cambridge, p. 154–156.
- TRINAJSTIĆ, I., 2008: Biljne zajednice Republike Hrvatske. Akademija šumarskih znanosti, Zagreb.
- TUTIN, T. G., N. A. BURGESS, A. O. CHATER, J. R. EDMONDSON, V. H. HEYWOOD, D. M. MOORE, D. H. VALENTINE, S. M. WALTERS & D. A. WEBB (eds.), 1993: Flora Europaea 1. 2nd ed. Cambridge University Press, Cambridge.
- TUTIN, T. G., V. H. HEYWOOD, N. A. BURGESS, D. M. MOORE, D. H. VALENTINE, S. M. WALTERS & D. A. WEBB (eds.), 1964–1980: Flora Europaea 1–5, Cambridge University Press, Cambridge.
- TZONEV, R. T., M. A. DIMITROV & V. H. ROUSSAKOVA, 2009: Syntaxa according to the Braun-Blanquet approach in Bulgaria. Phytologia Balcanica 15 (2), 209–233. Sofia.
- VALACHOVIČ, M., H. OĀAHELOVÁ, V. STANOVÁ & Š. MAGLOCKÝ, 1995: Rastlinné spoločenstvá Slovenska 1. Pionierska vegetácia. Veda, Bratislava.
- WHITE, J. & G. DOYLE, 1982: The vegetation of Ireland: a catalogue raisonné. In: WHITE, J. (ed.), Studies on Irish vegetation, Royal Dublin Society, Dublin, p. 289–368.

SAŽETAK

Zajednica vrste *Vulpia myuros* u Hrvatskoj

Z. Stančić

Ruderalna zajednica trave *Vulpia myuros* (L.) C. C. Gmelin prvi je puta pronađena u kontinentalnoj Hrvatskoj 2008. godine na nekoliko lokaliteta uz željezničku prugu, u blizini željezničkih stanica od Zaboka do glavnog kolodvora u Zagrebu. Zajednica raste u obliku niskog travnjaka na skeletnom i djelomično pjeskovitom tlu. Ima relativno kratki razvojni ciklus, a prepoznatljiva je krajem svibnja i početkom lipnja, nakon čega se biljke suše i većinom nestaju. U flornom sastavu, pored dominantne trave (*Vulpia myuros*), pojavljuje se relativno malo biljnih vrsta i uglavnom s malim pokrovnim vrijednostima. Sintaksonomski, zajednica je uvrštena u jednogodišnju do dvogodišnju ruderalnu vegetaciju reda *Sisymbrietalia* J. Tx. in Lohm. et al. 1962 i razreda *Chenopodietea* Br.-Bl. 1951. Zbog ruderalnog karaktera zajednica nije ugrožena. Budući da Hrvatska ima razvijenu mrežu željezničkih pruga, mogu se očekivati nova nalazišta navedene zajednice.

APPENDIX 1

The list of relevé localities:

relevé 1: locality: Zabok; Gauß-Krüger coordinates: x – 5570308, y – 5098194; date of sampling: 29/05/2008; **relevé 2:** Zabok; 5570148, 5098099; 29/05/2008; **relevé 3:** Novi Dvori; 5563499, 5081915; 08/06/2008; **relevé 4:** Zaprešić; 5563754, 5077855; 08/06/2008; **relevé 5:** Zaprešić; 5563782, 5077828; 08/06/2008; **relevé 6:** Podsused; 5566953, 5074832; 08/06/2008; **relevé 7:** Podsused; 5567211, 5074816; 08/06/2008; **relevé 8:** Zagreb West railway station; 5574023, 5074347; 08/06/2008; **relevé 9:** Zagreb, main railway station; 5575781, 5073774; 08/06/2008.