

Biotope preferences in groups of closely related species: a case study of *Sylvaemus* (Mammalia)

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abstract

The trapping of small mammals was carried out in 2017 to 2023 in the territory of the Kharkiv Oblast, Ukraine. In total, 19 biotopes were studied: different types of oak forest, dry and floodplain meadows, riparian vegetation, areas of the steppe, field protection forest strips, fields, as well as various ecotones. The trapping of small mammals was carried out using the standard trap-line method on 93 trap lines. With a trapping effort of 17 310 trap-nights, 1295 individuals of small mammals were caught, 689 of which belonged to the genus *Sylvaemus*. Three species of mice of the genus *Sylvaemus* were found in the territory of Kharkiv Oblast during the study period: *Sylvaemus uralensis*, *Sylvaemus sylvaticus*, and *Sylvaemus tauricus*. According to the relative abundance, wood mice can be arranged in the following order: *uralensis* > *sylvaticus* > *tauricus*. The cyclicity of annual fluctuations in relative abundance is not noticeable. The similarity of the abundance fluctuation in *S. sylvaticus* and *S. tauricus* was revealed, taking into account that these are competing species. *S. uralensis* and *S. sylvaticus* lead the top three dominant species in the overall dominance structure of small mammals. The highest relative abundance of wood mice during the study period was recorded on dry meadows, on the border of riparian vegetation with fields and floodplain meadows, on the border of field protective forest strips with fields, and in dry maple-linden-oak forest. *S. uralensis* belongs to the eurytopic species, is found in almost all studied biotopes, avoids oak forests, occurs on the edges of forests, dominates in abundance in open biotopes, in particular in the steppe, on dry meadows, riparian vegetation, and field protection forest strips. *S. sylvaticus* is also prone to eurytopy, it is recorded in significant abundance in both open and forest biotopes, mostly prefers riparian vegetation, field protection forest strips, dry coniferous forest, fresh maple-linden-oak forest and forest edges. *S. tauricus* is found mostly in forest biotopes, in particular in various types of oak forest and on forest edges, it prefers field protection forest strips with an old stand of oak, linden, and robinia. All three species of mice of the genus *Sylvaemus* are common species.

Біотопні преференції в групах близьких видів: приклад з *Sylvaemus* (Mammalia)

Оксана Марковська

Резюме. Обліки дрібних ссавців проводили з 2017 по 2023 рік на території Харківської обл.. Досліджено 19 біотопів: різні типи дібров, суходільні та заплавні луки, прибережно-водна рослинність, ділянки степу, полезахисні лісосмуги, поля, а також різні варіанти екотонів. Облік чисельності дрібних ссавців проводили стандартним методом пастко-ліній. Закладено 93 пастко-лінії, відпрацьовано 17310 пастко-ночей та зловлено 1295 особин дрібних ссавців, 689 з яких належали до роду *Sylvaemus*. На території Харківської області за період дослідження виявлено три види мишаків роду *Sylvaemus*: *Sylvaemus uralensis*, *Sylvaemus sylvaticus*, *Sylvaemus tauricus*. За відносною чисельністю, мишаків можна розташувати в такому порядку: *uralensis* > *sylvaticus* > *tauricus*. Циклічності річних коливань відносною чисельності не помітно. Виявлена подібність коливання чисельності у *S. sylvaticus* та *S. tauricus*, беручи до уваги, що це конкуруючі види. *S. uralensis* та *S. sylvaticus* очолюють трійку домінуючих видів в загальній структурі домінування дрібних ссавців. Найбільша відносна чисельність мишаків за період дослідження зафіксована на суходільних луках, на межі прибережно-водної рослинності з полями та заплавними луками, на межі полезахисних лісосмуг з полями та в сухій кленово-липовій діброві. *S. uralensis* належить до євритопних видів, зустрічається майже в усіх досліджених біотопах, уникає дібров, трапляється на узліссях, за чисельністю домінує в відкритих біотопах, зокрема в степу, на суходільних луках, прибережно-водній рослинності та полезахисних лісосмугах. *S. sylvaticus* також схильний до євритопності, в значній кількості зафіксований як у відкритих, так і в лісових біотопах, здебільшого надає перевагу прибережно-водній рослинності, полезахисним лісосмугам, сухому хвойному лісу, свіжій кленово-липовій діброві та узліссям. *S. tauricus* зустрічається здебільшого в лісових біотопах, зокрема в різних типах дібров та на узліссях, надає перевагу полезахисним лісосмугам зі старим деревостоєм дуба, липи та робінії. Всі три види мишаків роду *Sylvaemus* належать до звичайних видів.

Ключові слова: *Sylvaemus*, відносна чисельність, біотопічна преференція, багаторічний моніторинг, категорія рясноти.

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Introduction

The mice of the genus *Sylvaemus* belong to the sibling species, which are widely distributed in the western part of the Palearctic [Canady *et al.* 2014]. *S. uralensis* inhabits a wide geographical area in Central Europe, the Baltic region, and in the east through the western part of Russia and Ukraine to eastern Kazakhstan, mountainous Altai, north-western China and in the south to the Caucasus region and northern Turkey [Canady *et al.* 2014]. The geographic range of *S. sylvaticus* in Europe extends north to Scandinavia, east to central Belarus, east of Ukraine and west of Russia, which serves as its eastern border, south to north-western Turkey [Wilson & Reeder 2005] and in some regions of North Africa [Schlitter *et al.* 2016]. Currently, *S. tauricus* is absent from the Iberian Peninsula [Michaux *et al.* 2005], western France, northern Belgium and the Netherlands, its range extends north to Finland, the Baltic States, western Russia and some regions of Anatolia (while it is absent in Africa and Iceland) [Amori *et al.* 2016].

S. uralensis is a typical steppe element, a common species of a variety of open habitats, which can reach high abundance in areas of sparse vegetation along temporary streams or swamps even under the extreme climatic conditions of the semi-deserts of Central Asia. In the highlands of the Mongolian Altai, *S. uralensis* is also found in floodplain larch forests [Shar *et al.* 2015]. In Central Europe, it reaches its maximum density in areas of coastal lowland forests, willows and shrubs along swampy habitats [Knitlova & Horacek 2017]. In Anatolia, Russia and Armenia, this species prefers forests [Balasanyan *et al.* 2018; Frynta *et al.* 2006; Krystufek & Vohralík 2007]. *S. uralensis* is more common in eastern Ukraine [Hooper *et al.* 2007]. A typical eurytopic species, most characteristic of agrocoenoses and shrub thickets [Zagorodniuk 2006].

S. sylvaticus prefers ecotone habitats with dense herbaceous vegetation and low canopy, including forest edges, field edges, shrublands, field protective forest strips, and parks [Kuncova & Frynta 2009; Jojic *et al.* 2014], eurytopic [Popov 1993], occupies territories from plains to the dwarf pine zone [Canady & Mosansky 2015], absent in large forest areas [Popov 1993], found even on sand dunes [Marsh & Harris 2000]. *S. sylvaticus* is found in forests along river valleys of the central, western, and northern regions of Ukraine and is most common in the northern region. It is practically not known from the regions of the south-east of Ukraine. Thus, the species is rare in this region and probably reaches its south-eastern distribution borders [Hoofer *et al.* 2007]. It has a low degree of biotope preference to floodplains [Naglov 1989].

S. tauricus inhabits mature deciduous [Vukicevic-Radic *et al.* 2006; Yalden 1971], mixed or coniferous forests [Niethammer 1969], with a high and dense canopy [Michaux *et al.* 2005], which show a great diversity of seed tree species [Yalden & Shore 1991], with fallen trees, branches and stones, can also occur in fields [Popov 1993, Naglov & Tkach 2002]. Barciova & Macholan [2006] also emphasise that *S. tauricus* prefers forests with a well-developed canopy, while *S. sylvaticus* avoids continuous forest areas. During peaks of density, migrates to arable land and gardens [Lesinski *et al.* 2020]. Specimens of *S. tauricus* were collected from all forest habitats and regions of Ukraine, with the exception of steppe areas [Hoofer *et al.* 2007].

Despite the fact that these species have different ecology, their ecological needs partially overlap and they often live in syntopy [Marsh & Harris 2000].

The aim of the research is to study the specifics of the ecology of mice of the genus *Sylvaemus*, in particular their relative abundance, place in the dominance structure, biotope preferences, and categories of species presence.

Study area

Small mammals were captured in 2017 to 2023 in four administrative districts of Kharkiv Oblast, in the surroundings of eight settlements: Bohodukhiv Raion (Guryev Kozachok, Kolomak), Krasnohrad Raion (Vlasivka, Rozsokhuvata), Chuhuiv Raion (Haidary), Kupiansk Raion (Krasne Pershe, Nesterivka, and Novomlynsk).

Different types of oak forests, dry and floodplain meadows, riparian vegetation, steppe areas, field protective forest strips, fields, and various ecotones were studied (Table 1).

Table 1. Studied biotopes in the surroundings of settlements of Kharkiv Oblast in 2017–2023

Таблиця 1. Досліджені біотопи в околицях населених пунктів Харківщини за 2017–2023 рр.

Biotope code	Biotope	GK	K	V	R	H	D	N
St	steppe						+	+
DM	dry meadows	+	+	+	+	+		
DM/FM	dry meadows/floodplain meadows		+	+				
DM/F	dry meadows/field		+		+	+	+	
F	field			+	+	+		
FM	floodplain meadows		+	+	+	+	+	+
RV/FM	riparian vegetation/floodplain meadows	+	+	+	+	+	+	+
RV/F	riparian vegetation/field		+	+	+			
FPS	field protective forest strip	+	+		+			
FPS/DM	field protective forest strip/dry meadows		+		+		+	
FPS/F	field protective forest strip/field				+			
RF	ravine forest							+
DCF	dry coniferous forest			+				
DMLF	dry maple-linden-oak forest		+	+		+	+	
DMLF/DM	dry maple-linden-oak forest/dry meadows			+		+		
DMLF/FM	dry maple-linden-oak forest/floodplain meadows					+		
DMLF/F	dry maple-linden-oak forest/field					+		
FMLF	fresh maple-linden-oak forest		+			+		
MMLF	moist maple-linden-oak forest					+		

Note: GK—Guryev Kozachok, K—Kolomak, V—Vlasivka, R—Rozsokhuvata, H—Haidary, D—Dvorichansky National Nature Park (Krasne Pershe, Novomlynsk), N—Nesterivka.

Materials and Methods

Micromammals were captured by the standard trap-line method using Gero traps [Kucheruk 1952; Numerov *et al.* 2010], equipped with standard bait (rye bread crust with unrefined sunflower oil). The traps were placed 5 metres apart in a line. We set 25/50/75/100/150 traps in a line, and trapping was carried out during one night in each habitat. Whenever possible, the surveys were conducted three times a year in spring, summer, and autumn.

The research was conducted over seven years, from spring 2017 to autumn 2023. A total of 93 trap-lines were laid for 17 310 trap-nights (Table 2) (Guryev Kozachok—100 t/n, Kolomak—2700 t/n, Vlasivka—1700 t/n, Rozsokhuvata—5700 t/n, Haidary—3845 t/n, Dvorichansky NNP—1315 t/n, Nesterivka—1950 t/n) and 1295 small mammals were caught, 689 of which belonged to the genus *Sylvaemus*.

Table 2. Trapping efforts (trap-nights) in the studied biotopes of Kharkiv Oblast in 2017–2023

Таблиця 2. Кількість відпрацьованих пастко-ночей в досліджених біотопах Харківщини за 2017–2023 рр.

Biotope	2017	2018	2019	2020	2021	2022	2023
St	500	300	175	–	150	–	–
DM	300	325	1100	250	875	200	–
DM/FM	–	–	125	100	100	–	–
DM/F	200	100	200	25	175	–	–
F	–	60	150	50	200	–	–
FM	–	75	175	–	–	–	–
RV/FM	315	435	575	125	400	50	–
RV/F	200	150	50	450	400	50	300
FPS	–	125	150	–	100	–	–
FPS/DM	–	–	50	–	150	–	–
FPS/F	–	50	125	250	950	500	500
RF	300	150	75	100	100	–	–
DCF	–	–	50	50	100	–	–
DMLF	300	485	350	400	450	–	–
DMLF/DM	100	25	250	–	100	–	–
DMLF/FM	–	110	75	–	100	–	–
DMLF/F	–	85	75	–	50	–	–
FMLF	–	270	450	–	250	–	–
MMLF	–	50	–	–	50	–	–
Total	2215	2795	4200	1800	4700	800	800

In 2017, 8 habitats were surveyed with an effort of 2215 trap-nights, in 2018—2795 trap-nights and 16 habitats, in 2019—4200 trap-nights and 18 habitats, in 2020—1800 trap-nights and 10 habitats, in 2021—4700 trap-nights and 18 habitats, in 2022—800 trap-nights and 4 habitats, in 2023—800 trap-nights and 2 habitats.

Results and Discussion

Sylvaemus in the general structure of species dominance and their relative abundance

During the survey period, 1295 specimens were caught, of which 689 belonged to the genus *Sylvaemus*: *Sylvaemus uralensis*—359, *Sylvaemus sylvaticus*—195, and *Sylvaemus tauricus*—135 (Table 3).

In 2017, the top three dominant species included only *S. uralensis*, and in 2018—only *S. tauricus*. From 2019 to 2023, the top three dominant species were led by *S. uralensis* and *S. sylvaticus*, and in 2021, all three species of wood mice were recorded among the dominant species (Table 3). In general, in terms of relative abundance, the wood mice can be ranked in the following order: *uralensis* > *sylvaticus* > *tauricus*. If we look at annual fluctuations in relative abundance (Fig. 1), we do not see any characteristic cyclicity. Noteworthy is the similarity of population fluctuations in *S. sylvaticus* and *S. tauricus*, given that these are competing species.

Table 3. Trapping dynamics of small mammals during the research period from spring 2017 to autumn 2023

Таблиця 3. Динаміка відлову дрібних ссавців за період досліджень з весни 2017 по осінь 2023 року

Species	2017		2018		2019		2020		2021		2022		2023	
	n	N	n	N	n	N	n	N	n	N	n	N	n	N
<i>Apodemus agrarius</i>	69	3.12	22	0.79	55	1.31	9	0.50	33	0.70	4	0.50	7	0.88
<i>Sylvaemus uralensis</i>	59	2.66	12	0.43	119	2.83	44	2.44	98	2.09	14	1.75	13	1.63
<i>Sylvaemus sylvaticus</i>	23	1.04	8	0.29	75	1.79	40	2.22	30	0.64	12	1.50	7	0.88
<i>Sylvaemus tauricus</i>	39	1.76	16	0.57	25	0.60	17	0.94	32	0.68	6	0.75	–	–
<i>Mus musculus</i>	4	0.18	10	0.36	11	0.26	9	0.50	15	0.32	–	–	2	0.25
<i>Mus spicilegus</i>	–	–	–	–	6	0.14	1	0.06	1	0.02	–	–	–	–
<i>Micromys minutus</i>	1	0.05	2	0.07	3	0.07	1	0.06	1	0.02	–	–	–	–
<i>Microtus levis</i>	48	2.17	–	–	14	0.33	5	0.28	4	0.09	1	0.13	–	–
<i>Myodes glareolus</i>	85	3.84	15	0.54	23	0.55	11	0.61	9	0.19	1	0.13	3	0.38
<i>Terricola subterraneus</i>	–	–	3	0.11	1	0.02	–	–	–	–	–	–	–	–
<i>Cricetulus migratorius</i>	2	0.09	–	–	3	0.07	2	0.11	6	0.13	1	0.13	3	0.38
<i>Sorex araneus</i>	13	0.59	7	0.25	15	0.36	18	1.00	7	0.15	–	–	–	–
<i>Sorex minutus</i>	1	0.05	–	–	5	0.12	11	0.61	4	0.09	–	–	–	–
<i>Crocidura suaveolens</i>	1	0.05	–	–	2	0.05	12	0.67	1	0.02	–	–	–	–
<i>Neomys fodiens</i>	1	0.05	1	0.04	–	–	–	–	–	–	–	–	–	–
<i>Dryomys nitedula</i>	1	0.05	–	–	–	–	–	–	–	–	–	–	–	–
Total	347	15.7	96	3.43	357	8.50	180	10.0	241	5.13	39	4.88	35	4.38

Note: N—relative abundance, $N = n \times 100/D$, where n—number of trapped individuals, D—trapping effort [Numerov et al. 2010].

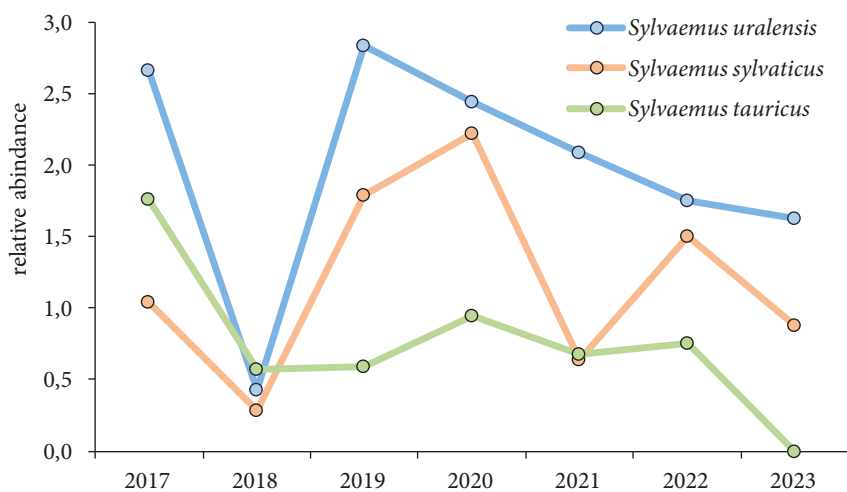


Fig. 1. Dynamics of abundance of mice of the genus *Sylvaemus* during 2017–2023. Рис. 1. Динаміка чисельності мишаків роду *Sylvaemus* протягом 2017–2023 рр.

Distribution of mice of the genus *Sylvaemus* in the studied habitats

In 2017, wood mice were found in all of the studied habitats (Table 4). In forest habitats, the relative abundance was high in the ravine forest (*S. uralensis*, *S. tauricus*), dry maple-linden-oak forest (*S. tauricus*) and its edge with dry meadows (*S. sylvaticus*, *S. tauricus*). In open habitats, the relative abundance was somewhat lower, with the majority of wood mice recorded in the steppe (*S. uralensis*), on the border of riparian vegetation with floodplain meadows and fields (*S. uralensis*).

In 2018, out of the studied habitats, no wood mice were recorded in the steppe and on the border of dry maple-linden-oak forest and dry meadows, unlike the previous year. The total relative abundance this year was extremely low, with the highest number of wood mice caught in the dry maple-linden-oak forest and on the edge of floodplain meadows (*S. tauricus*), as well as in floodplain meadows (*S. tauricus*), on the border with riparian vegetation (*S. uralensis*), and on the border of dry meadows and field (*S. uralensis*).

In 2019, wood mice were caught in all of the studied habitats. A higher relative abundance was recorded in open habitats, particularly, as in the previous year, in dry meadows and their borders

with field (*S. uralensis*, *S. sylvaticus*), on the border of riparian vegetation and floodplain meadows (*S. uralensis*, *S. sylvaticus*). In forest habitats, the highest number of wood mice was found in fresh maple-linden-oak forest (*S. sylvaticus*, *S. tauricus*) and on the border of field protective forest strips with fields (*S. uralensis*).

Table 4. The relative abundance (N) of mice of the genus *Sylvaemus* in the researched habitats in the territory of Kharkiv Oblast

Таблиця 4. Відносна чисельність (N) мишаків роду *Sylvaemus* в досліджених біотопах Харківщини

Biotope	2017	2018	2019	2020	2021	2022	2023
St	0.72	0,00	0.10	–	0,00	–	–
DM	0.27	0.07	1.48	0.17	1.00	1.00	–
DM/FM	–	–	0.05	0.17	0,00	–	–
DM/F	0.41	0.18	0.57	0.11	0.15	–	–
F	–	0.04	0.02	0,00	0.06	–	–
FM	–	0.14	0.02	–	–	–	–
RV/FM	0.63	0.18	0.48	0.28	0.89	0,00	–
RV/F	0.54	0.07	0.17	2.94	0.17	0,00	1.88
FPS	–	0.04	0.31	–	0.13	–	–
FPS/DM	–	–	0.02	–	0.04	–	–
FPS/F	–	0.07	0.57	0.56	0.32	3.00	0.63
RF	1.04	0.07	0.02	0.17	0.17	–	–
DCF	–	–	0.21	0.33	0,00	–	–
DMLF	0.95	0.11	0.21	0.89	0.15	–	–
DMLF/DM	0.90	0,00	0.17	–	0.15	–	–
DMLF/FM	–	0.14	0.05	–	0.06	–	–
DMLF/F	–	0.04	0.05	–	0.02	–	–
FMLF	–	0.04	0.71	–	0.06	–	–
MMLF	–	0.11	–	–	0.02	–	–

In 2020, no wood mice were found in the fields of the studied habitats. The highest relative abundance was recorded on the border of riparian vegetation and field (*S. sylvaticus*, *S. uralensis*), in dry maple-linden-oak forest (*S. tauricus*) and, as in the previous year, on the border of field protective forest strips with fields (*S. uralensis*).

In 2021, no wood mice were caught in the steppe, on the border of dry and floodplain meadows, as well as in dry coniferous forest. The highest relative abundance was recorded in dry meadows (*S. uralensis*, *S. sylvaticus*), on the border of riparian vegetation and floodplain meadows (*S. uralensis*), and on the border of field protective forest strips with fields (*S. uralensis*, *S. tauricus*).

In 2022, no wood mice were found on the border of riparian vegetation with floodplain meadows and fields. As in previous years, the majority of wood mice were caught on the border of field protective forest strips with fields (*S. uralensis*, *S. sylvaticus*).

In 2023, the highest relative abundance, unlike the previous year, was recorded at the border of riparian vegetation and field (*S. uralensis*).

In general, during the study period, most wood mice were caught in dry meadows, on the border of riparian vegetation with fields and floodplain meadows, on the border of field protective forest strips with fields, and in a dry maple-linden-oak forest.

Biotopic preferences

The degree of biotopic preferences is calculated according to the formula

$$F_{ij} = (n_{ij} \times N - n_i \times N_j) / (n_{ij} \times N + n_i \times N_j - 2n_{ij} \times N_j),$$

where n_{ij} is the number of individuals of i species in j sample (habitat) with a volume of N_j ; n_i is the number of individuals of the species in all captures with a total volume of N [Zagorodniuk & Naglov 2017]. The data necessary for calculating the degree of biotopic preference are summarised in Table 5.

The value of F_{ij} ranges from -1 to $+1$:

-1 —the species is absent in the habitat;

$+1$ —the species occurs only in this habitat;

0 —the species is indifferent to this habitat (neither prefers nor avoids).

Thus, if the value is less than zero, the species avoids the studied habitat; if it is greater than zero, the species prefers the studied habitat, and the closer the value is to 1, the greater the preference of the species to this habitat.

Also, this value allows to determine the eurytopy or stenotopy of the species. If a species occurs only in one habitat (+1), or gives it a greater preference ($> +0.7$) with a negative or indifferent (close to zero) 'attitude' to other habitats, then it is a *stenotopic* species. If the preference value in all studied habitats is equal to zero or deviate slightly (within ± 0.3) from zero, then the species should be classified as *eurytopic*. An intermediate position is occupied by species that have sufficient ecological valence (plasticity) and occur in several habitats [Zagorodniuk & Naglov 2017].

Table 5. The number of trapped mice of the genus *Sylvaemus* among the total number of caught individuals and species in the studied habitats for the total period of trapping (2017–2023)

Таблиця 5. Кількість зловлених мишаків роду *Sylvaemus* серед загальної кількості зловлених особин та видів в досліджених біотопах за весь період відлову (2017–2023 рр.)

Biotope	<i>S. uralensis</i> <i>n</i>	<i>S. sylvaticus</i> <i>n</i>	<i>S. tauricus</i> <i>n</i>	Sum <i>n</i>	Sum sp
St	20	–	–	58	8
DM	94	32	2	209	12
DM/FM	4	1	–	22	8
DM/F	32	9	6	84	9
F	1	3	1	26	6
FM	1	1	3	18	7
RV/FM	64	19	3	190	12
RV/F	51	44	2	163	12
FPS	9	6	5	21	4
FPS/DM	1	2	–	7	4
FPS/F	47	20	13	107	9
RF	15	3	19	99	6
DCF	5	10	–	17	4
DMLF	5	10	41	132	8
DMLF/DM	6	18	10	48	5
DMLF/FM	4	1	4	10	4
DMLF/F	–	–	4	9	3
FMLF	–	16	18	63	6
MMLF	–	–	4	6	3
Total	359	195	135	1295	16

Note: Sum *n*—total number of individuals; Sum sp—total number of species.

According to the degree of biotopic preference (Table 6), *S. uralensis* belongs to eurytopic species, occurs in almost all studied habitats, avoids oak forests, occurs on forest edges, and by abundance dominates in open habitats, in particular in the steppe, dry meadows, riparian vegetation, and field protective forest strips. *S. sylvaticus* is also prone to eurytopy as it is recorded in large numbers in both open and forest habitats, mostly preferring riparian vegetation, field protective forest strips, dry coniferous forest, fresh maple-linden forest and forest edges. *S. tauricus* occurs mainly in forest habitats, in particular in various types of oak forests and on forest edges, preferring field protective forest strips with old oak (*Quercus robur* L.), linden (*Tilia cordata* Mill.), and robinia (*Robinia pseudoacacia* L.) stands.

Distribution of mice of the genus *Sylvaemus* by abundance categories

According to I. Zagorodniuk and O. Kyseliuk [Zagorodniuk 2002; Zagorodniuk *et al.* 2002], there are six categories of species presence: absent, 0—the portion in the sample is zero; rare (very rare), 1—from 0 to 1%; occasional, 2—from 1 to 3%; frequent, 3—from 3 to 10%; common, 4—from 10 to 30%; and abundant, 5—from 30 to 100%.

According to the obtained abundance scores (Table 7), all three species of mice of the genus *Sylvaemus* are common species.

Table 6. Values of the degree of biotopic preference (F_{ij}) of mice of the genus *Sylvaemus*

Таблиця 6. Показники ступеня біотопної приуроченості (F_{ij}) мишаків роду *Sylvaemus*

Biotope	<i>S. uralensis</i>	<i>S. sylvaticus</i>	<i>S. tauricus</i>	Sp in hab with $F_{ij} > 0$
St	0.1	-1.0	-1.0	5
DM	0.3	0	-0.9	7
DM/FM	-0.2	-0.5	-1.0	5
DM/F	0.2	-0.2	-0.2	6
F	-0.8	-0.1	-0.5	3
FM	-0.7	-0.5	0.2	5
RV/FM	0.1	-0.2	-0.8	6
RV/F	0.1	0.3	-0.8	7
FPS	0.2	0.3	0.4	4
FPS/DM	-0.3	0.3	-1.0	3
FPS/F	0.3	0.1	0.1	6
RF	-0.3	-0.7	0.3	3
DCF	0,0	0.6	-1.0	3
DMLF	-0.8	-0.4	0.6	4
DMLF/DM	-0.4	0.5	0.4	3
DMLF/FM	0.2	-0.2	0.6	2
DMLF/F	-1.0	-1.0	0.6	3
FMLF	-1.0	0.3	0.5	3
MMLF	-1.0	-1.0	0.7	3

Note: Sp in hab—the number of species that occur in the habitat.

Table 7. Estimated numbers and abundance of small mammals in the territory of Kharkiv Oblast in the survey period of 2017–2023

Таблиця 7. Оцінка чисельності та ряснота дрібних ссавців на території Харківщини за результатами обліків 2017–2023 рр.

Species	Relative abundance (N)	% in the sample	Abundance scores	Presence category
<i>Apodemus agrarius</i>	1.15	15.37	4	common
<i>Sylvaemus uralensis</i>	2.07	27.72	4	common
<i>Sylvaemus sylvaticus</i>	1.13	15.06	4	common
<i>Sylvaemus tauricus</i>	0.78	10.42	4	common
<i>Mus musculus</i>	0.29	3.94	3	frequent
<i>Mus spicilegus</i>	0.05	0.62	1	rare
<i>Micromys minutus</i>	0.05	0.62	1	rare
<i>Microtus levis</i>	0.42	5.56	3	frequent
<i>Myodes glareolus</i>	0.85	11.35	4	common
<i>Terricola subterraneus</i>	0.02	0.31	1	rare
<i>Cricetulus migratorius</i>	0.10	1.31	2	occasional
<i>Sorex araneus</i>	0.35	4.63	3	frequent
<i>Sorex minutus</i>	0.12	1.62	2	occasional
<i>Crocidura suaveolens</i>	0.09	1.24	2	occasional
<i>Neomys fodiens</i>	0.01	0.15	1	rare
<i>Dryomys nitedula</i>	0.01	0.08	1	rare

Conclusions

1. During the study period, three species of mice of the genus *Sylvaemus* were found in Kharkiv Oblast: *Sylvaemus uralensis*, *Sylvaemus sylvaticus*, and *Sylvaemus tauricus*.
2. *Sylvaemus uralensis* and *S. sylvaticus* lead the top three dominant species in the general structure of small mammal dominance.
3. The highest relative abundance of wood mice during the study period was recorded in dry meadows, on the border of riparian vegetation with fields and floodplain meadows, on the border of field protective forest strips with fields, and in a dry maple-linden-oak forest.
4. *Sylvaemus uralensis* is a eurytopic species, *S. sylvaticus* is prone to eurytopy, and *S. tauricus* is found mostly in forest habitats.
5. All three species of mice of the genus *Sylvaemus* are common species.

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