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SPECIES DIVERSITY AND DISTRIBUTION OF SYNANTHROPIC ACARID MITES (ACARIFORMES, ACARIDIA) IN TRANSCARPATHIA

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Species Diversity and Distribution of Synanthropic Acarid Mites (Acariformes, Acaridia) in Transcarpathia. Dudynska, A. T., Romanko, V. O., Dudynsky, T. T., Karabiniuk, M. M. & Zhovnerchuk, O. V. — This article presents the results of research on the species composition of acarid mites and their abundance in Transcarpathia. 24 species of acarids were identified in the studied substrates. The maximum number of species was found in the lowlands — 24, in the foothills — 20, and in the mountainous areas — 17. The highest number of mites was collected in the foothills (2031 individuals), and the lowest — in the mountain area (1149). The indices of the species diversity of acarid mites in different altitudinal zones were not characterized by significant fluctuations. A significant correlation (–0.75) was found between altitudinal zonation and the number of mites species. The lowest indicators of species richness and number of acarid mites were identified in haylofts, regardless of their zonal distribution. On the other hand, in the other synanthropic sites we studied, the greatest diversity of mites was found in storehouses and the maximum number of mites in barns.
Key words: acarid mites, synanthropic species, distribution, altitudinal zonation, climate conditions, Transcarpathia, Ukraine.

Introduction

From a practical point of view, the interest in acarid mites is mainly due to the fact that many of them are pests of plant products, especially in their storage conditions (grain storehouses, vegetable storehouses and other warehouses). In particular, species of the genera *Acarus* and *Tyrophagus*, with their mass reproduction, are capable of causing significant damage to grain seeds and grain products (flour, cereals, compound feed, etc.) (Romanko et al., 2015; Mamontov et al., 2012).

In addition, acarid mites also play an important role in many biocenoses. The ecological characteristics of granary mites have always attracted the attention of researchers due to their prevalence and harmfulness. First of all, certain features of the ecological niches of granary mites, their trophicity, dependence on abiotic and biotic conditions of existence in different physical and geographical zones of Ukraine were studied (Akimov, 1985; Kadzhaia, 2009; Dudynska, Dudynsky, 2015). For example, S. P. Kovalishyna (Kovalishyna, 2006) studied acarid complexes of anthropogenic and semi-natural biotopes of the Right Bank Central Forest Steppe of Ukraine. S. N. Pyatkova studied this group of mites in granaries of the Donetsk Region (Pyatkova, 2001). The study of species groups of acarid mites in agricultural and industrial sites on the territory of Zhytomyr Polissia was carried out by Y. R. Oksentiuk (Oksentiuk et al., 2022).

Ecological and faunal studies of this group of mites were previously carried out in Transcarpathia (Dudynska, Dudynsky, 2015, Dudynska et al., 2021). The authors did not investigate the correlation between some climatic and geographical factors with the diversity and number of mites, which led to further research in this direction.

The purpose of this scientific research was to study and conduct a comparative analysis of the species diversity, distribution and abundance of synanthropic granary mites of the Acaridia group in Transcarpathia under different climatic conditions and altitudes.

Material and Methods

Observation and sampling of mites was carried out from barns with animals, chicken coop, warehouse storage or outbuildings for storage of plant products and hayloft in the summer period during 2016–2019. The collection of material was carried out on the territory of 24 settlements of Transcarpathia. In each settlement, farm buildings were selected in such a way that it was possible to collect material from barns, chicken coops, warehouses and haylofts. In total, 480 samples were collected and processed in synanthropic places in the lowland, foothills and mountain zone of the Transcarpathian Region.

The material collection and analysis were performed in accordance with methods having been adapted to acarological studies (Giljarov, 1975).

The eclection method of Berlese with Tullgren modification was used for quantitative collection.

All mite counts were performed using an Omax binocular microscope. The collected material was stored in entomological tubes in a 70 % alcohol solution. To determine the species composition of acarid mites, permanent total preparations were made using Hoyer's mounting fluid.

The obtained data were subjected to statistical processing (Pesenko, 1982), as well as using mathematical functions built into the Microsoft Excel program.

To characterize species biodiversity, density, frequency of occurrence, and indices of dominance, Menkhinik, Margalef and Shannon were determined (Pesenko, 1982; Shitikov et al., 2003).

A hypsometric and a climatic map were developed using modern geoinformation systems in the ArcGIS 10.4.1 software environment, showing the sampling points during the field research period. The hypsometric map of the Transcarpathian Region was developed on the basis of SRTM with an actual spatial extent of 83 m according to the methodology tested by us in the study and geoinformation analysis of dangerous natural processes and phenomena. Climatic maps were developed by manual vectorization of raster data based on atlas cartographic materials. The precipitation map presents the spatial distribution of annual precipitation amounts within the Transcarpathian region. The air temperature map is based on the data of average monthly air temperatures (°C) in July. All cartographic materials were developed with reference to spatial data in the standardized geographic coordinate system WGS 84 (Karabiniuk et al., 2020; Karabiniuk et al., 2022).

Results and Discussion

Transcarpathia is an interesting region of Ukraine for research, the specificity of which is due to its climatic and landscape features. Because of this, the species distribution and distribution of mites in different altitudinal zones, even within the same region, can differ significantly. Figure 1 and table 1 show the collection sites of acarid mites, which were determined taking into account the maximum representation of various types of economic buildings in one settlement.

Based on the indicators of vertical zonation (fig. 1, a), average monthly temperature in July (fig. 1, b) and average annual precipitation (fig. 1, c), we conventionally divided the territory of the collection sites into three parts (zones):

1. "Lowland" with parameters (from 100 to 200 meters above sea level; from "18" to "21 and above" °C; from "less than 700" to "800" mm). This zone included such settlements as: Baranyntsi, Mali Heivtsi, Strabichovo, Popovo, Velyka Byihan, Muzhijevo, Sokyrnytsia and Khudlevo.

2. "Foothills" (from 201 to 400 meters above sea level; within 16–17 °C; within 800–1000 mm). This zone included such settlements as: Poroshkovo, Poliana, Kushnytsia, Dragovo, Bilky, Novoselytsia, Veliki Bychkiv and Dilove.

3. "Mountain" zone with indicators (over 401 meters above sea level; within "17" and "less than 15" °C; within 900–1000 mm). This zone included such settlements as: Uzhok, Zhdenievo, Pylypets, Synevyr, Kolochava, Ust-Chorna, Keveliv, Rakhiv (fig. 1; table 1).

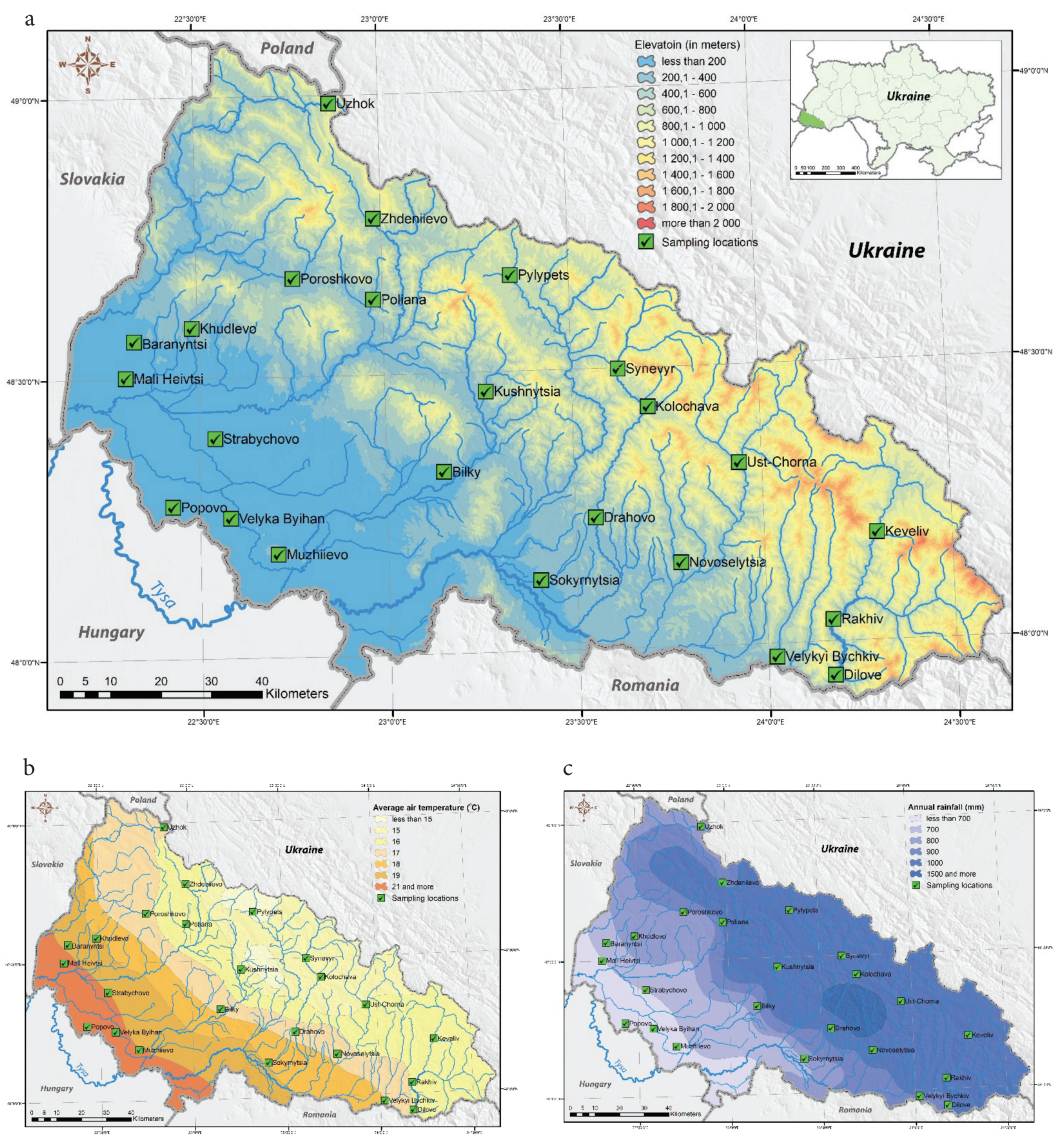

Fig. 1. Map of acarid mites collection sites in Transcarpathian Region: a — map of Transcarpathian Region by altitudinal zonation; b — air temperature map of Transcarpathian Region; c — precipitation map of Transcarpathian Region.

Table 1. Places of collection of acarid mites on the territory of Transcarpathia taking into account climatic conditions and altitudinal zonation

Settlements	Height above sea level, m	Temperature, °C	Precipitation, mm
		Lowland	
Baranyntsi	113	19	700
Mali Heivtsi	104	21 and above	less than 700
Strabichovo	109	21 and above	700
Popovo	105	21 and above	less than 700
Velyka Byihan	108	21 and above	less than 700
Muzhievo	117	21 and above	less than 700
Sokyrnytsia	183	18–19	800
Khudlevo	181	19	800
		Foothills	
Poroshkovo	243	17	800–900
Poliana	268	16	1000
Kushnytsia	257	16	1000
Dragovo	361	17	1000
Bilky	173	17	800-900
Novoselytsia	343	17	1000
Velikyi Bychkiv	299	18	900
Dilove	361	16–17	900–1000
		Mountains	
Uzhok	576	16–17	800-900
Zhdenievo	432	16	900-1000
Pylypets	575	less than 15	1000
Synevyr	626	15	1000
Kolochava	552	15	1000
Ust-Chorna	514	15	1000
Keveliv	585	16	1000
Rakhiv	484	16–17	1000

It should be noted that not all collection sites were subject to the parameters of the zones indicated by us. In this case, an individual approach was applied to each settlement based on the majority and significance of indicators of climatic conditions and altitudinal zonation.

One of the examples is the village of Bilky. Despite the fact that it is only 173 m above sea level, Bilky was assigned to the "Foothill zone", since the average monthly temperature in July and annual precipitation were 17 °C and 800–900 mm, respectively. These values differ significantly from the climatic indicators of "Lowlands". The village of Uzhok was also included in the "mountain zone", because despite relatively high temperatures of 16–17 °C, this settlement is located at an altitude of 576 meters above sea level (table 1).

In general, the amplitude of the vertical zonation of the collection sites ranged from 104 m (Mali Heivtsi) to 626 m above sea level (Synevyr); temperature ranged from "21 °C and above" (Mali Heivtsi, Strabichovo, Popovo, Velyka Byihan, Muzhievo) to "less than 15 °C" (Pylypets); the amount of precipitation ranged from "less than 700" (Mali Heivtsi, Popovo, Velyka Byihan, Muzhievo) to 1000 mm (Poliana, Kushnytsia, Dragovo, Novoselytsia, Pylypets, Synevyr, Kolochava, Ust-Chorna, Keveliv, Rakhiv).

A correlation was ascertained between the above parameters: inverse between vertical zonation and temperature (–0.85), as well as between temperature and precipitation (–0.93); direct — between vertical zonation and precipitation (0.8).

According to the materials of these studies, 24 species of acarid mites were found in the farm buildings of Transcarpathia.

In the lowlands, we identified all 24 species of mites belonging to the families Acaridae Latreille, 1802; Chortoglyphidae Berlese, 1897; Glycyphagidae Berlese, 1887. The vast majority of these pests (15 species) belong to the Acaridae family.

Not all species are exclusively synanthropic, since the vast majority of them are also found in natural conditions. However, in case of providing a large number of nutritious substrates and at the same time favorable temperature and humidity conditions, these species become the most numerous in places where products are stored. This also applies to mites of the genus *Glycyphagus*, although they are inferior to acarids in their species diversity.

The following species were found with the highest density and frequency of occurrence in lowland areas in the samples: *Acarus siro* (2.08 individuals; 82.50 %), *Tyrophagus putrescentiae* (1.49 individuals; 71.25 %), *Glycyphagus burchanensis* (0.96 individuals; 56.25 %), *Neoacotyledon sokolovi* (0.67 individuals; 48.13 %) and *Chortoglyphus arcuatus* (0.63 individuals; 51.88 %). According to the established indices of dominance, the species *A. siro* belongs to the dominant species; species *Acarus farris, Gl. burchanensis, Glycyphagus domesticus, T. putrescentiae, Tyrophagus perniciosus, Tyrophagus formicetorum, Tyrophagus humerosus, N. sokolovi, Ch. arcuatus, Gohieria fusca* and *Tyrolichus case*i are classified as subdominant in the lowlands. The subdominants of the 1st order are the species *Glycyphagus destructor, Glycyphagus michaeli, Tyrophagus longior, Neoacotyledon rhizoglyphoides, Ctenoglyphus plumiger, Ctenoglyphus canestrinii, Aleuroglyphus ovatus, Caloglyphus rodionovi, Carpoglyphus lactis* and the secondary members are the following species of mites: *Tyrophagus similis, Tyrophagus mixtus* and *Tyrophagus molitor* (table 2).

Two species of acarid mites — *T. mixtus* and *T. molitor* — found in the lowland part of Transcarpathia are quite rare here. For example, *T. mixtus* was found only in a few samples taken from cow mangers, storage rooms and haylofts. As a rule, this species occurs in samples taken from the cracks of farm buildings (e. g., between the manger of farm animals and the wall, where the sample consisted of the accumulation of feed residues for farm animals). Such places are characterized by high humidity and lack of direct sunlight. Such

Table 2. Quantitative indicators of diversity of acarid mites in the lowland zone of Transcarpathia

No	Species	Average number of individuals	V, ind.	P, %	D_i	Levels of dominance
1	*A. siro*	332.25	2.08	82.50	14.90	D
2	*A. farris*	96.0	0.60	32.50	1.70	SD
3	*Gl. burchanensis*	153.63	0.96	56.25	4.70	SD
4	*Gl. destructor*	52.50	0.33	34.38	0.98	SD 1th level
5	*Gl. domesticus*	89.50	0.56	45.63	2.22	SD
6	*Gl. michaeli*	29.75	0.19	25.63	0.41	SD 1th level
7	*T. putrescentiae*	238.38	1.49	71.25	9.23	SD
8	*T. perniciosus*	78.88	0.49	33.75	1.45	SD
9	*T. formicetorum*	83.50	0.52	40.00	1.82	SD
10	*T. longior*	22.88	0.14	12.50	0.16	SD 1th level
11	*T. humerosus*	70.50	0.44	37.50	1.44	SD
12	*T. similis*	13.75	0.09	12.50	0.09	SM
13	*T. mixtus*	6.63	0.04	6.88	0.02	SM
14	*T. molitor*	6.88	0.04	7.50	0.03	SM
15	*N. sokolovi*	107.63	0.67	48.13	2.81	SD
16	*N. rhizoglyphoides*	47.13	0.29	30.00	0.77	SD 1th level
17	*Ch. arcuatus*	100.13	0.63	51.88	2.82	SD
18	*G. fusca*	67.50	0.42	42.50	1.56	SD
19	*Ct. plumiger*	40.13	0.25	30.63	0.67	SD 1th level
20	*Ct. canestrinii*	28.75	0.18	28.75	0.45	SD 1th level
21	*T. casei*	69.88	0.44	41.25	1.57	SD
22	*Al. ovatus*	42.13	0.26	28.75	0.66	SD 1th level
23	*C. rodionovi*	30.00	0.19	24.38	0.40	SD 1th level
24	*C. lactis*	31.88	0.20	22.50	0.39	SD 1th level

Note. D_i — dominance index, V, ind. — density, (individuals); P % — frequency of occurrence; Levels of dominance (D — dominant species; SD — subdominant species; SD 1st level — subdominants of the 1st order manger; SM — secondary members).

conditions are preferred by the majority of discovered species of the genus *Tyrophagus*. Due to its rare occurrence in the studied farm buildings, this species can be classified as an accidental synanthropic species.

T. molitor is a rather rare species in synanthropic conditions, and is much less common than *T. perniciosus* and *T. putrescentiae*. It was found in grain from storage areas, near the feeder in the chicken coops, and in several samples taken from haylofts. *T. molitor* is not an exclusively synanthropic species and gravitates to natural conditions of existence. Its entry into synanthropic conditions is probably accidental due to its introduction into farm premises with the help of animals.

In our collections, *T. similis* was identified in samples consisting of straw residues taken from the barn floor, hay storage places, old bedding from the chicken coop, which consisted of straw and hay.

The species abundance of acarids in the foothills was lower, compared to the lowlands, and consisted of the dominant species: *A. siro, T. putrescentiae*; subdominants — *Gl. burchanensis, Gl. destructor, Gl. domesticus, T. perniciosus, N. sokolovi, N. rhizoglyphoides, Ch. arcuatus, G. fusca, Ct. plumiger, T. casei* and *Al. ovatus;* subdominants of the 1st order — *A farris, Gl. michaeli, T. formicetorum, T. humerosus and Ct. canestrinii;* and secondary members*: C. rodionovi* and *C. lactis* (table 3).

Accordingly, *A. siro* and *T. putrescentiae* stand out with high density and frequency of occurrence in the samples. *Gl. burchanensis N. sokolovi* and *Gl. destructor* are characterized by somewhat lower indices of density and frequency of occurrence.

As for the secondary members according to dominance index, *C. rodionovi* was found in samples taken from barns (manger and floor) as well as chicken coops.

These mites should be attributed to hygro- and thermophilic species because they have the ability to form hypopuses when humidity and temperature decrease. That is why the damage caused by these mites, becomes to be more noticeable on products stored in humid conditions.

Table 3. Quantitative indicators of the diversity of acarid mites in the foothills zone of the Transcarpathian Region

No	Species	Average number of individuals	V, ind.	P, %	Di	Levels of dominance
1	*A. siro*	353.75	2.21	86.25	15.02	D
2	*A. farris*	74.25	0.46	26.88	0.98	SD 1th level
3	*Gl. burchanensis*	167.75	1.05	65.63	5.42	SD
4	*Gl. destructor*	161.38	1.01	66.88	5.31	SD
5	*Gl. domesticus*	92.13	0.58	40.00	1.81	SD
6	*Gl. michaeli*	19.25	0.12	15.00	0.14	SD 1th level
7	*T. putrescentiae*	295.00	1.84	80.00	11.62	D
8	*T. perniciosus*	76.63	0.48	31.25	1.18	SD
9	*T. formicetorum*	41.63	0.26	19.38	0.40	SD 1th level
10	*T. humerosus*	35.00	0.22	13.75	0.24	SD 1th level
11	*N. sokolovi*	157.75	0.99	71.88	5.58	SD
12	*N. rhizoglyphoides*	71.63	0.45	38.75	1.37	SD
13	*Ch. arcuatus*	112.13	0.70	47.50	2.62	SD
14	*G. fusca*	79.63	0.50	42.50	1.67	SD
15	*Ct. plumiger*	71.38	0.45	43.13	1.52	SD
16	*Ct. canestrinii*	50.63	0.32	32.50	0.81	SD 1th level
17	*T. casei*	76.75	0.48	49.38	1.87	SD
18	*Al. ovatus*	76.75	0.48	55.63	2.10	SD
19	*C. rodionovi*	8.88	0.06	5.00	0.02	SM
20	*C. lactis*	8.75	0.05	5.00	0.02	SM

Note. D_i — dominance index, V, ind. — density, (individuals); P % — frequency of occurrence; Levels of dominance (D — dominant species; SD — subdominant species; SD 1st level — subdominants of the 1st order; SM — secondary members).

The low frequency of occurrence of *C. lactis* in the territory is probably explained by low ecological valence, low fecundity and, in our opinion, its fastidiousness to feed substrates.

Worth mentioning is the fact that the number of species of acarids in mountainous areas was the lowest and consisted of only 17 species. When analyzing the dominance structure of acarid_mites in the mountain zone, two species (*A. siro* and *T. putrescentiae*) were identified, dominance index of which exceeded the indicator of 10 %. However, the main part of the species diversity in the studied samples of the mountainous regions consisted of subdominant species (*Gl. burchanensis, Gl. destructor, Gl. domesticus, N. sokolovi, Ch. arcuatus, G. fusca*) and subdominants of the 1st order (*A. farris, T. perniciosus, T. humerosus, N. rhizoglyphoides, Ct. plumiger* and *T. casei*). Secondary species were the following: *T. mixtus, Ct. canestrinii* and *C. rodionovi* (table 4).

No such species as *Gl. michaeli, T. formicetorum, T. longior, T. similis, T. molitor, Al. ovatus, C. lactis* were found in the mountain zone. In addition, in this zone, the lowest indicators of species diversity and number of acarid mites were identified, compared to other high-altitude zones of Transcarpathia. Thus, the number of mite species in barns, chicken coops, storage rooms and haylofts was within 12–13. And the average values of the number of mites range from 172.3 (haylofts) to 391.6 individuals (barns). Hence, the number of mites in barns was 2.27 times higher than in haylofts. The number of mites in chicken coops and warehouses was similar and amounted to 288.8 and 296.5 individuals, respectively (fig. 2). Such a gradation of values is probably due to more optimal conditions for the development of mites in barns, where relatively stable and high temperature and humidity indicators are maintained.

As a result of the study, a significantly higher species diversity and number of acarid mites were found in the lowlands and foothills than in the mountainous zone. Thus, in the lowlands, the diversity of mites in barns, chicken coops and warehouses is represented by 23–24 species. Only in haylofts, species abundance was 17 species.

In the foothills, the number of identified species was lower and amounted to 20 species in barns, 20 species in chicken coops, 16 species in warehouses, and only 13 species in haylofts.

Table 4. Quantitative indicators and structure of dominance of acarid mites in the mountainous zone of Transcarpathia

No	Species	Average number of individuals	V, ind.	P, %	Di	Levels of dominance
1	*A. siro*	233.88	1.46	64.38	13.10	D
2	*A. farris*	29.50	0.18	10.00	0.26	SD 1th level
3	*Gl. burchanensis*	110.38	0.69	52.50	5.04	SD
4	*Gl. destructor*	90.63	0.57	40.00	3.15	SD
5	*Gl. domesticus*	100.50	0.63	48.75	4.26	SD
6	*T. putrescentiae*	177.25	1.11	66.25	10.22	D
7	*T. perniciosus*	32.88	0.21	15.63	0.45	SD 1th level
8	*T. humerosus*	17.00	0.11	8.75	0.13	SD 1th level
9	*T. mixtus*	8.13	0.05	3.13	0.02	SM
10	*N. sokolovi*	103.00	0.64	56.88	5.10	SD
11	*N. rhizoglyphoides*	13.25	0.08	8.75	0.10	SD 1th level
12	*Ch. arcuatus*	91.25	0.57	48.75	3.87	SD
13	*G. fusca*	61.25	0.38	38.13	2.03	SD
14	*Ct. plumiger*	39.13	0.24	21.25	0.72	SD 1th level
15	*Ct. canestrinii*	5.88	0.04	1.88	0.01	SM
16	*T. casei*	28.00	0.18	18.13	0.44	SD 1th level
17	*C. rodionovi*	7.25	0.05	3.75	0.02	SM

Note: D_i — dominance index, V, ind. — density (individuals); P % — frequency of occurrence; Levels of dominance (D — dominant species; SD — subdominant species; SD 1st level — subdominants of the 1st order; SM — secondary members).

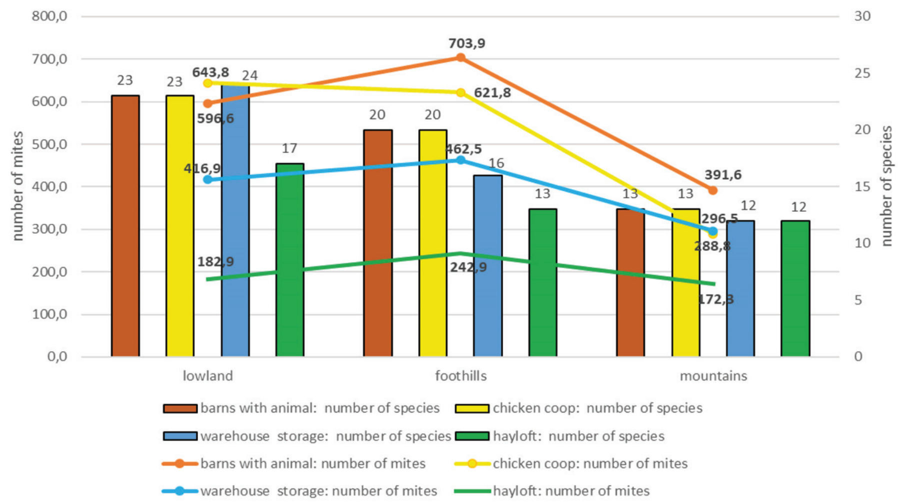

Fig. 2. Species diversity and the number of acarid mites in farm buildings in different zones of Transcarpathia.

However, in contrast to the species abundance, the number of mites was higher in the foothills. Thus, the average values of the number of mites in the barns of the lowlands were 643.8, and in the foothills were 703.9 individuals. A similar trend was observed in warehouses and haylofts, where the number of mites in the foothills was 9.86 and 24.71 % higher, respectively, compared to the lowlands. Only in chicken coops, the number of mites in the foothills was somewhat lower and amounted to 621.8, while in the lowlands to 643.8 individuals.

The analysis of indices of species biodiversity of acarid mites in Transcarpathia showed insignificant fluctuations in their values, which is due to a low indicator of species biodiversity. Thus, the value of Shannon index was in the range from 2.43 (mountain zone) to 2.82 (lowlands) (fig. 3).

It is known that the value of the diversity index, provided that the species composition is small, is more affected by species abundance than the number of individuals (Shitikov, et al., 2003). The value of Margalef coefficient reflects the density of species, or species abundance, in a certain area, that is, the higher the value of the index, the more diverse in terms of species composition the coenosis is. The difference in the value of the index in

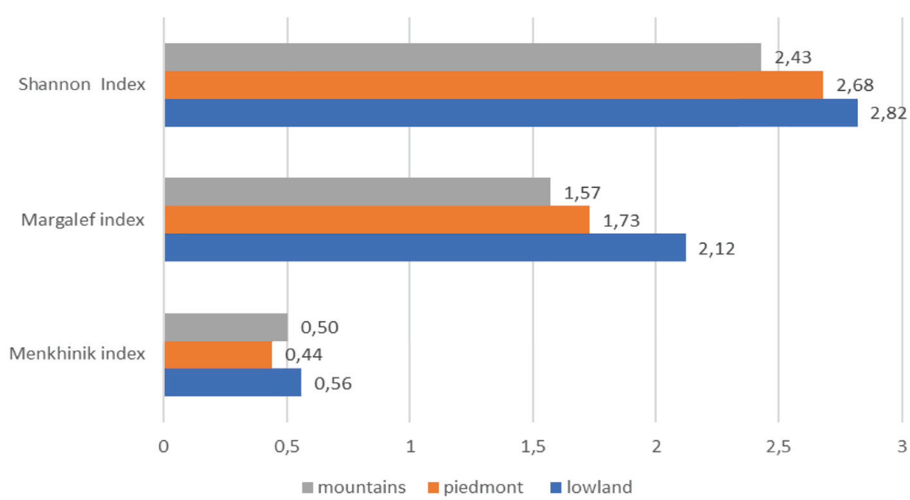

Fig. 3. Indices of species biodiversity of acarid mites in Transcarpathia.

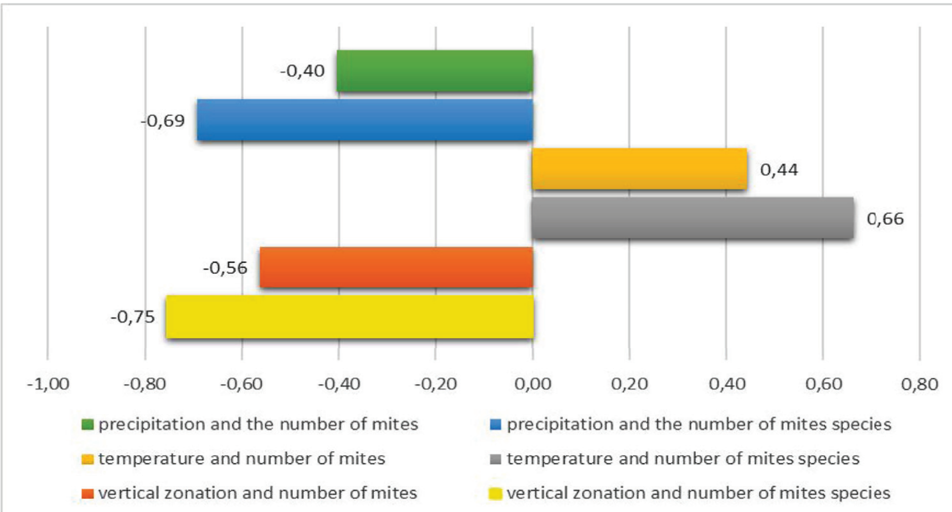

Fig. 4. Correlation between the studied parameters.

the mountain and foothill zones studied by us was not significant and ranged from 1.57 to 1.73, respectively. Whereas, in the lowlands, this indicator was much higher — 2.12. The increase in the value of Margalef coefficient was influenced, first of all, by the species diversity of lowland acarid mites.

In contrast to the above indices, the value of Menkhinik index turned out to be the lowest for the foothills (0.44), which is due to the high number of mites and, at the same time, the insignificant species abundance.

A significant inverse correlation (–0.75) was identified between vertical zonation and the number of mite species (fig. 4). A somewhat lower correlation coefficient was observed between temperature and the number of mite species, and the inverse correlation was observed between precipitation and the number of mite species. The value of the correlation coefficient between precipitation and number of mites, as well as temperature and number of mites was –0.40 and 0.44, respectively, which characterizes them as a moderate relationship.

Thus, on the basis of developed maps and analysis of collected material in various farm buildings, the structure and diversity of acarid mites in the territory of Transcarpathia was investigated. Attempts were also made to determine the correlation between some climatic and geographical factors as well as the species abundance of mites and their number.

Conclusions

1. On the territory of Transcarpathia, in the studied locations, 24 species of acarid mites were identified. The maximum number of species was found in the lowlands — 24, in the foothills — 20, and in the mountainous areas — only 17.

2. The lowest number of acarid mites was found in the mountain zone (1,149 individuals). However, in contrast to the species abundance, the number of mites was higher in the foothills (2,031 individuals) than in the lowlands (1,840 individuals).

3. Only *A. siro* belongs to the dominant species in the conditions of the Transcarpathian lowlands. While in the foothills and mountainous conditions, the dominant species also include *T. putrescentiae*, in addition to *A. siro*. In general, regardless of climatic conditions, vertical zoning and the type of farm buildings, subdominant species prevail in the substrates we studied, in particular, such as *N. socolovi*, *Gl. domesticus*, etc.

4. In haylofts, regardless of zonation, the lowest indicators of species abundance and number of acarid mites were identified (12–17 species and 172.3–242.9 individuals). While the highest species diversity of acarid mites was found in warehouses (12–24 species), and their number in barns (391.6–703.9 individuals).

5. Analysis of indices of species biodiversity of acarid mites on the territory of Transcarpathia showed insignificant fluctuations in their values, which is due to a low rate of species biodiversity. Thus, the value of Shannon index ranged from 2.43 (mountain zone) to 2.82 (lowlands); the value of Margalef index ranges from 1.57 (mountain zone) to 2.12 (lowlands); the value of Menkhinik index turned out to be the lowest for the foothills (0.44), and the highest for the lowlands (0.56).

6. A close correlation was found only between altitudinal zonation and the number of mite species (–0.75). The value of the correlation coefficient between precipitation and the number of mites was –0.40, and between temperature and the number of mites was 0.44, which indicates their insignificant dependence.

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