

MITES (PARASITIFORMES AND ACARIFORMES) OF TREES FROM LANDSCAPE RESERVES OF THE REPUBLIC OF MOLDOVA

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Abstract: 103 species of mites have been recorded in the studied landscape reserves, eight of which are the most common and constant throughout all these reserves. The dominant mite species are the representatives of the families Tetranychidae, Tenuipalpidae, Tydeidae and Phytoseiidae. 42 species are relatively rare and 18 are very rare in the fauna of the Republic of Moldova; also was recorded 1 new species (*Tydeus longisetosus*) in the area. The maximum number of rare species was found in the reserve Codrii Tigheci.

Keywords: fauna, landscape reserves, mites, Republic of Moldova

Introduction:

The ecosystem of landscape reserves in the Republic of Moldova provides the necessary link between the growing plants and creates favorable conditions for mites' diversity and rare species recording (Andreev 2002). Some species of phytophagous mites when reaching high population densities substantially damage trees and shrubs, and thereby harm the forest (Kulikova 2007, 2008, 2010). Natural enemies of phytophagous mites are the predatory mites of the family Phytoseiidae. The purpose of this study was the study of diversity and trophic structure of tree and shrub mites within the landscape reserves of the Republic of Moldova.

Materials and methods:

Plant samples (leaves) were collected at a distance of 50 and 100 meters from the edge of the forest, on a platform of 100 meters length. The samples were collected in the period of 2009 - 2013. 18 species of trees and shrubs have been investigated. 3974 mite species were registered. The studies have been conducted in the landscape reserves: in the north – Tețcani area, Dolna area; in the center - Căpriană - Scoreni area, Trebujeni area, Gordinești area, Rădeni area; in the south - Codrii Tigheci area. Mite species were characterized by indicators of abundance as follows: very rare (VR); rare (R); common (C); abundant (A) and very abundant (VA). The collected data were analyzed by means of these indices: Shannon diversity (Ish), evenness (V), Simpson polydominance (Ip), Simpson concentration (Is), community species composition after Sorensen (Ks). Mites' number was calculated by counting individuals under the microscope MBS-10. Species composition

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was determined under a binocular microscope Leica CME.

Results and discussion:

In landscape reserves from the northern, central and southern zones 103 species of mites have been registered, one of them being a new species *Tydeus longisetosus* for the fauna of the Republic of Moldova. Mites from 13 families have been recorded: predators from Phytoseiidae, Anystidae, Cunaxidae, Stigmaeidae, Johnstonianidae, Erythraeidae families; phytophagous from Tetranychidae, Bryobiidae, Tenuipalpidae, Eriophyidae, Acaridae families and mycophagous from Tarsonemidae and Tydeidae families. The highest diversity of tick species was registered among the families: Phytoseiidae (28), Tydeidae (25), Tetranychidae (13). In [Table 1 \(Annexes\)](#) it is shown the list of mites, the indices, the habitats and the new species for the fauna of Moldova.

In the reserve Codrii Tigheci the most common are the predatory mites *Euseius finlandicus*, *Kampimodromus aberrans*, *Typhloctonus formosus*. The dominant is *Euseius finlandicus*. There were as well recorded common species of mycophagous mites *Tydeus caudatus*, *Lorryia wainsteini*, *L. lena*, *Triophtydeus flatus*, *Acotyledon agilis*, *Cenopalpus pulcher*. The family Tydeidae is typical of mycophagous mites (19), whereas the species *Lorryia wainsteini* was found, this one being a phytophagous exclusively in this reserve. Certain species of mite dominates among phytophagous. There were found 29 very rare species and 14 rare species of fauna specific to the Republic of Moldova were encountered ([Tab. 1, Annexes](#)). There were found 2 specimens of *Erythraeus* sp. larvae which are not included in the plant mites' trophic structure, since they are insect parasites.

In the reserve Căpriana - Scoreni among the common phytophagous mites there were found *Cenopalpus pulcher* and *Triophtydeus flatus*, of which *Cenopalpus pulcher* is

dominant. Among the common species of predators *Euseius finlandicus*, *Kampimodromus aberrans*, *Typhloctonus squamiger*, the dominant is *Euseius finlandicus*. There were registered 23 very rare species, as well as 6 rare species and one new species of mites (*Tydeus longisetosus*) as part of the fauna of the Republic of Moldova.

In the Dolna reserve, the most common are the mites *Lorryia elinguis*, *L. ferula*, *Triophtydeus flatus*, *Eotetranychus fraxini*, *Cenopalpus piger*, *Euseius finlandicus*, *Typhloctonus squamiger*, *Kampimodromus aberrans* of which the following predators are dominant ones: *Euseius finlandicus*, *Typhloctonus squamiger* and phytophagous *Eotetranychus fraxini*, *Cenopalpus piger*. Furthermore, 6 are very rare and 2 rare species of ticks were revealed.

In the Trebujeni reserve, the dominant predators were identified as being *Typhlodromus pyri* and *Typhloctonus formosus*. There were encountered 21 very rare species and other 6 mite species of fauna of the Republic of Moldova prove rare.

In the Gordinești reserve, there was registered the lowest diversity of mites as compared to other reserves. The dominant predator *Euseius finlandicus* and phytophagous *Cenopalpus pennatisetus* were singled out. There are 3 very rare and other 4 species were rare.

The faunal complexes of mites in the Tețcani reserves (*Tydeus inclutus*, *Euseius finlandicus*, *Amblyseius andersoni*, *Kampimodromus aberrans*, *Triophtydeus immanis*) and Rădeni (*Lorryia reticulata*, *L. devexa*, *Eustigmaeus pinnata*, *Spinibdella cronini*) were determined. Among them *Tydeus inclutus*, *Lorryia reticulata*, *L. devexa*, *Eustigmaeus pinnata*, *Spinibdella cronini* are very rare in nature reserves. The mites *Lorryia reticulata*, *Eustigmaeus pinnata*, *Spinibdella cronini* are comprised by the total number of mites on the landscape reserves of the Republic of Moldova.

The results obtained in the course of research in the landscape reserves, have

highlighted a diversity of mites ranging from 9 to 83 species, and the ratio of the dominant species of phytophagous to establish in each reserve dominant predators. During the studies it was found that in the landscape reserve of various natural areas, the most common are the predators *Euseius finlandicus*, *Kampimodromus aberrans*, *Typhloctonus formosus*, *T. squamiger*, as well as the phitophagous *Lorryia ferula*, *L. lena*, *Triophtydeus flatus*, *Cenopalpus pulcher*, *C. piger*. Also, the trophic structure of mite complexes in the reserves were established, these being different, coming second to the species of dominant phytophagous species: in the north, *Eotetranychus fraxini* and *Cenopalpus piger*; in the center, *Cenopalpus pulcher*; in the south, *Lorryia wainsteini* and *Triophtydeus flatus*. The dominance of the phytophagous species in a specific reserve is determined by: humidity, lighting regime and the type of the host plant. In this regard, they are in some cases dominant, in others they move into the category of conventional or are even absent. It was revealed that with increasing

phytophagous density there also increased sharply the density of predators. In all the landscape reserves of different natural areas the dominant position is occupied by predator species of genus *Amblyseius* - *Euseius finlandicus*. This species, due to the competitive actions of other species, proves of great importance in the Republic of Moldova as the most common and abundant. Other species have been classified as common. The author established the similarity of occurrence places as 42 very rare, 18 rare mite species and 1 new species, *Tydeus longisetosus*, namely the edge of forest and forest areas, where the forest canopy is less dense. Among the observed diversity the most rare species of the mites *Tarsonemus florocolus*, *Tetranychopsis horridus*, and *Anthoseius pirianykae* were found only in north; 19 very rare, 5 new in the south and one new species, whereas 15 very rare lying in central zone. It was determined the highest diversity of mites (1.142) in the reserve Codrii Tigheci (central natural area) (Tab. 2).

Table no. 2 Indices of diversity and community of mites fauna from the landscape reserves of the Republic of Moldova

Indices	Gordinești	Codrii Tigheci	Dolna	Trebujeni	Căpriana - Scoreni
Ish	0.353	1.142	0.903	1.024	1.073
Ip	1.608	6.126	7.309	6.820	7.399
V	0.178	0.074	0.456	0.194	0.172
Ks	0.17		0.24	0.49	0.57

The diversity of mites in this reserve differs from others by a small amount of rare and very rare species of mites - 42 species. Out of these, 28 mite species are rare for all reserves (Tab. 1, Annexes). This testifies about the uniqueness of the area. It was also revealed that the particularities of the location of reserves Tețcani, Dolna, Gordinești, Rădeni formed the lowest species diversity of mites.

Analysis of the similarity of species composition of mites from the reserves

Codrii Tigheci and Căpriana-Scoreni was 0.57, and with Trebujeni 0.49, which indicates their closeness. The species composition of mites from reserves Gordinești and Dolna was extremely poor, which conditioned the very low similarity with Codrii Tigheci.

Conclusions:

The fauna of mites from landscape reserves is represented by 103 species, of which 42 rare, 18 very rare and 1 new species (*Tydeus longisetosus*) for the fauna of the Republic of Moldova.

The analysis allowed us to identify the differences among diversity of mites, revealed significant difference and similarity between the faunas of the reserves in North, Central and South natural areas identified, emphasizing on each territory the complex of dominant mites.

Rezumat:

PĂDUCHII (PARASITIFORMES ȘI ACARIFORMES) COPACILOR DIN ZONELE REZERVAȚIILOR REPUBLICII MOLDOVA

103 specii de păduchi au fost înregistrate în zonele protejate studiate, dintre care opt sunt cele mai comune și constante pe întreaga întindere a acestor rezervații. Speciile de păduchi dominante fac parte din familiile Tetranychidae, Tenuipalpidae, Tydeidae și Phytoseiidae. 42 de specii sunt relativ rare, iar 18 au o frecvență foarte redusă în cadrul

faunei Republicii Moldova; de asemenea, s-a înregistrat o nouă specie (*Tydeus longisetosus*) în zonă. Numărul maxim de specii rare a fost găsit în rezervația Codrii Tigheci.

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Annexes:

Table no. 1 Analysis of mites fauna from landscape reserves of the Republic of Moldova

No.	Mite species	Gordinești		Codrii Tigechi		Dolna		Trebujeni		Căpriana – Scoreni	
		A	I _s	A	I _s	A	I _s	A	I _s	A	I _s
	Fam. Tarsonemidae (Kramer, 1877)										
1	<i>Tarsonemus angulatus</i> (Schaarschmidt, 1959)			C	0.013			D	0.01	D	0.005
2	<i>T. bifurcatus</i> (Schaarschmidt, 1959)									D	0.005
3	<i>T. ellipticus</i> (Schaarschmidt, 1959)			D	0.001						
4	<i>T. floricolus</i> (Canestrini et Fanzago, 1876)					D	0.02				
5	<i>T. bilobatus</i> (Suski, 1965)			C	0.003	D	0.02			D	0.005
6	<i>T. hermes</i> (Suski, 1965)			C	0.006					D	0.005
7	<i>T. lobus</i> (Suski, 1967)			R	0.002			D	0.01	D	0.009
8	<i>T. lobosus</i> (Suski, 1965)			D	0.001						
9	<i>T. nodosus</i> (Schaarschmidt, 1959)			C	0.006			D	0.01		
10	<i>T. talpae</i> (Schaarschmidt, 1959)			C	0.01			D	0.01	R	0.014
11	<i>T. virgineus</i> (Suski, 1969)			C	0.004						
12	<i>T. sp. 3</i>			C	0.008						
13	<i>Phytonemus pallidus</i> (Banks, 1898)			D	0.001						
14	<i>Schaarschmidtia naegelei</i> (Suski, 1967)			A	0.037			D	0.01		
	Fam. Tydeidae (Kramer, 1877)										
15	<i>Tydeus argutus</i> (Kuznetzov & Petrov, 1981)			D	0.001						
16	<i>T. caudatus</i> (Duges, 1834)			MA	0.082					D	0.005
17	<i>T. californicus</i> (Banks, 1904)			C	0.009			R	0.03	C	0.075
18	<i>T. dignus</i> (Livshitz, 1973)			D	0.001						
19	<i>T. inclutus</i> (Livshitz, 1973)							D	0.01		
20	<i>T. longisetosus</i> (Kuznetzov et Zapletina, 1972)									D	0.004
21	<i>T. kochi</i> (Oudemans, 1928)							R	0.04	R	0.014
22	<i>Lorryia obstinata</i> (Livshitz, 1973)			R	0.003					D	0.005
23	<i>L. elinguis</i> (Kuznetzov, 1973)			D	0.001	C	0.16			D	0.005
24	<i>L. placita</i> (Livshitz, 1973)			D	0.001			D	0.01	D	0.005
25	<i>L. devexa</i> (Kuznetzov, 1973)			C	0.011						
26	<i>L. praefata</i> (Kuznetzov et Zapletina, 1973)	R	0.048	C	0.007						
27	<i>L. wainsteini</i> (Kuznetzov, 1973)	D	0.024	MA	0.154					R	0.019
28	<i>L. ferula</i> (Baker, 1944)			MA	0.062	C	0.106	D	0.01	C	0.028
29	<i>L. formosa</i> (Livshitz, 1972)			C	0.004						
30	<i>L. lena</i> (Kuznetzov, 1973)	D	0.024	MA	0.12			D	0.02	D	0.01
31	<i>L. mali</i> (Oudemans, 1929)	D	0.02	C	0.01	D	0.02			D	0.005
32	<i>L. dumosa</i> (Kuznetzov, 1973)									D	0.009
33	<i>L. visenda</i> (Kuznetzov, 1973)									R	0.014
34	<i>Triophtydeus immanis</i> (Kuznetzov, 1973)			R	0.002			R	0.03	R	0.019
35	<i>T. flatus</i> (Kuznetzov et Livshitz, 1973)			MA	0.134	C	0.159	C	0.07	C	0.107
36	<i>T. fragarius</i> (Baker 1944)			A	0.015						

37	<i>Homeopronematus anconai</i> (Baker, 1944)			C	0.01			C	0.08		
38	<i>Pronematus sextoni</i> (Baker, 1968) Fam. Cunaxidae (Thor, 1902)			C	0.006			D	0.01	D	0.005
39	<i>Cunaxoides fidus</i> (Kuznetsov et Livshitz, 1975) Fam. Stigmaeidae (Oudemans, 1931)			D	0.001						
40	<i>Barbutia</i> sp.			D	0.001						
41	<i>Zetzellia mali</i> (Ewing, 1917) Fam. Johnstonianidae (Thor, 1935)			A	0.002			R	0.03		
42	<i>Diplothrombium</i> sp. Fam. Erythraeidae (Oudemans, 1902)							D	0.01		
43	<i>Erythraeus</i> sp. 2 Fam. Anystidae (Oudemans, 1902)			D	0.001						
44	<i>Anystis</i> sp. Fam. Tetranychidae (Donnadieu, 1875)			D	0.001						
45	<i>Panonychus ulmi</i> (C.L. Koch, 1836)			D	0.001						
46	<i>Eotetranychus pomeranzevi</i> (Reck, 1956)			D	0.001			C	0.09	D	0.005
47	<i>E. uchidai</i> (Ehara 1956)			D	0.001			D	0.01		
48	<i>E. ulmicola</i> (Reck, 1948)			R	0.003						
49	<i>E. tiliarium</i> (Hermann, 1804)			C	0.009						
50	<i>E. prunicola</i> (Livshitz, 1960)			R	0.003						
51	<i>E. uncatus exiguus</i> (Wainstein, 1956)			D	0.001						
52	<i>E. fraxini</i> (Reck, 1948)	R	0.07	C	0.01	C	0.14	R	0.04	C	0.06
53	<i>Amphitetranynchus viennensis</i> (Zacher, 1920)			D	0.001						
54	<i>Tetranychus urticae</i> (C.L. Koch, 1836)			D	0.001						
55	<i>T. loniceriae</i> (Beglyarov et Mitrofanov, 1973)							D	0.02		
56	<i>T. pamiricus</i> (Mitrofanov et Strunkova, 1980)			R	0.002						
57	<i>Oligonychus buschi</i> (Reck, 1956) Fam. Bryobiidae (Berlese, 1913)			R	0.003						
58	<i>Bryobia loniceriae</i> (Reck, 1956)			D	0.001						
59	<i>B. graminum</i> (Schrank, 1781)			R	0.003						
60	<i>B. redicorzevi</i> (Reck, 1947)			D	0.001						
61	<i>B. confusa</i> (Livshitz et Mitrofanov, 1966)									D	0.009
62	<i>Tetranychopsis horridus</i> (Canestrini et Fanzago, 1876) Fam. Tenuipalpidae (Berlese, 1913)							D	0,02		
63	<i>Cenopalpus piger</i> (Wainstein, 1960)			C	0.01	C	0.142				
64	<i>C. pennatisetus</i> (Wainstein, 1958)	C	0.15	R	0.003					C	0.075
65	<i>C. platani</i> (Livshitz et Mitrofanov, 1967)			D	0.001						
66	<i>C. pulcher</i> (Canestrini et Fanzago, 1876)			A	0.030					A	0.192
67	<i>C. wainsteini</i> (Livshitz et Mitrofanov, 1967) Fam. Eriophyidae (Nalepa, 1898)			R	0.003					D	0.005

68	<i>Eriophyes pyri</i> (Pagenstecher, 1857) Fam. Acaridae (Leach, 1816)				R	0.053	C	0.058			
69	<i>Acotyledon agilis</i> (Canestrini, 1888)			A	0.022				D	0.009	
70	<i>A. michaeli</i> (Oudemans, 1924)			D	0.001						
71	<i>A. rhizoglyphoides</i> (Zachvatkin, 1937)	R	0.05	C	0.01			C	0.05	D	0.009
72	<i>A. krameri</i> (Berlese, 1881) Fam. Phytoseiidae (Berlese, 1916)			C	0.012						
73	<i>Amblyseius andersoni</i> (Chant, 1957)			C	0.006					R	0.014
74	<i>A. nemorivagus</i> (Athias-Henriot, 1961)									D	0.005
75	<i>Euseius finlandicus</i> (Oudemans, 1915)	MA	1.57	MA	0.74	A	0.5	D	0.02	MA	0.61
76	<i>Neoseiulus reductus</i> (Wainstein, 1962)			D	0.001						
77	<i>N. astutus</i> (Beglyarov, 1960)			D	0.001						
78	<i>N. umbraticus</i> (Chant, 1956)			D	0.001						
79	<i>Typhloctonus formosus</i> (Wainstein, 1958)			MA	0.17	R	0.05	MA	0.59	C	0.11
80	<i>T. squamiger</i> (Wainstein, 1960)			MA	0.09	A	0.41	R	0.03	A	0.19
81	<i>Typhlodromus cotoneastri</i> (Wainstein, 1961)			A	0.02	D	0.02	C	0.16	C	0.03
82	<i>T. phialatus</i> (Athias-Henriot, 1960)			D	0.001						
83	<i>T. pyri</i> (Scheuten, 1857)			A	0.04			A	0.41	D	0.005
84	<i>T. rodovae</i> (Wainstein et Arutunjan, 1968)			R	0.003			D	0.02	D	0.009
85	<i>T. tiliae</i> (Oudemans, 1929)			D	0.001						
86	<i>T. halinae</i> (Wainstein et Kolodochka, 1974)			R	0.003						
87	<i>T. rapidus</i> (Wainstein et Arutunjan, 1968)	R	0.05								
88	<i>Anthoseius caudiglans</i> (Schuster, 1959)			C	0.013			D	0.02	C	0.023
89	<i>A. clavatus</i> (Wainstein, 1972)							D	0.01		
90	<i>A. inopinatus</i> (Wainstein, 1975)			D	0.001			D	0.02		
91	<i>A. pirianykae</i> (Wainstein, 1972)					D	0.04				
92	<i>A. rhenanus</i> (Oudemans, 1905)			C	0.01			D	0.01		
93	<i>Kampimodromus aberrans</i> (Oudemans, 1930)			A	0.03	C	0.16	C	0.05	A	0.24
94	<i>K. langei</i> (Wainstein et Arutunjan, 1973)			C	0.01			D	0.01		
95	<i>Eharius marzhaniani</i> (Arutunjan, 1969)			D	0.001					C	0.03
96	<i>Dubininellus juvenis</i> (Wainstein et Arutunjan, 1970)			R	0.003						
97	<i>D. echinus</i> (Wainstein et Arutunjan, 1970)			C	0.004					D	0.01
98	<i>Seiulus subsimplex</i> (Arutunjan, 1972)			D	0.001						
99	<i>Paraseiulus soleiger</i> (Ribaga, 1902)			R	0.003					D	0.04
100	<i>P. incognitus</i> (Wainstein et Arutunjan, 1967)							D	0.01		
No. of individuals:		83	3142	113	207	429					
No. of species:		9	83	16	36	43					