

RESEARCHES ON THE EDAPHIC MESOFAUNA IN SOME FOREST ECOSYSTEMS FROM MOLDAVIAN PLAIN

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This paper is devoted to the knowledge of the edaphic microarthropods from the organic horizon of some forest ecosystems (naturals and plantations), placed on the Moldavian Plain. The best populated forests were the nemoral ones, comparatively with the typical steppe forests. In the plantations, microarthropod densities are similar with that recorded in the natural forest ecosystems, but highest than the values from similar plantations. The distribution on taxonomic groups has shown a usual situation for forest ecosystems: the mites dominated in all stations, and the oribatids between them, were the numerous ones, followed by gamasids and then by actinedids.

Key words: *edaphic microarthropods, forests, plantations*

At present, the oak forests from the Moldavian Plain occupy an approximately surface of 14.5% of this region, and both with the plantations host a veritable biodiversity that must be known and preserved. The edaphic mesofauna have a big role in the pedogenesis process and proved a great sensitivity to the changes produced in their life environment [5]. In this paper has been analyzed in a comparative manner the edaphic microarthropods communities that populated the organic horizon of forest ecosystems, natural forests vs. plantations.

These researches financed by “Nucleu Biostar” Programme are a part from a series of investigations developed in different kinds of ecosystems from Moldavian Plain: meadows, agroecosystems and forests [1, 2, 3].

MATERIAL AND METHOD

Followed the observation and researches done in the field, there were selected representative *Quercus* forests on the Moldavian Plain, such as: Copălău - Botoșani county, Guranda - Botoșani county, Roșcani - Iași county, Zăicești - Botoșani county, Drislea - Botoșani county. The first two ones are placed on the Copălău-Cozancea heights, being considered as parts of nemoral zones, the others being typical forests of steppe. Also it were analyzed samples taken from 5 plantations: Berza - Botoșani county (acacia plantation of 50-60 years, with *Sambucus nigra* and herbaceous layer constituted by *Luzula sp.* and *Polygonatum latifolium*); Roșcani - Iași county (acacia plantation, of about 50 years, with *Sambucus nigra*, with umbeliferous in a compact layer and a facies of *Luzula sp.*); Deleni - Iași county (mixed plantation of pine, acacia, *Platanus sp.* and others); Zăicești - Botoșani county (*Pinus nigra* plantation with a thin

herbaceous layer formed by *Luzula* sp., *Valeriana officinalis* etc); Cinghinia - Botoșani county (*Pinus nigra* plantation, without grass bed).

In all these stations were taken series of soil of 5 samples with an area of 100 cm². The edaphic mesofauna was extracted by Tullgren – Berlese method, than it was sorted on systemics groups. In the end it was calculated the average of individuals abundance on each identified group.

RESULTS AND DISCUSSIONS

On the studied forests the microarthropods densities vary between 83.4 and 706.4 individuals/100 cm² (tab. 1).

Table 1

Average density of the edaphic microarthropods from the studied forests

Systematic group		Stations				
		Guranda	Copălău	Roșcani	Zăicești	Drislea
<i>Gamasida</i>	olf	100.0	50.8	74.4	52.8	8.4
	ah	3.0	6.4	8.6	6.8	3.4
	G	103.0	57.2	83	59.6	11.8
<i>Oribatida</i>	olf	280.6	247.6	306.4	228.6	19.8
	ah	10.4	20.0	21.6	27.8	7.8
	G	291.0	267.6	328.0	256.4	27.6
<i>Actinedida</i>	olf	8.2	5.8	6.2	3.0	1.0
	ah	2.6	5.0	1.2	1.6	4.0
	G	10.8	10.8	7.4	4.6	5.0
<i>Acaridida</i>	olf	0.4	3.0	2.4	1.0	-
	ah	0.2	-	0.4	0.4	-
	G	0.6	3.0	2.8	1.4	-
Total <i>Acari</i>	olf	389.2	307.2	389.4	285.4	29.2
	ah	16.2	31.4	31.8	36.6	15.2
	G	405.4	338.6	421.2	322.0	44.4
<i>Collembola</i>	olf	261.2	195.4	122.0	107.8	13.2
	ah	20.6	80	19.4	25.0	21.2
	G	281.8	275.4	141.4	135.8	34.4
Other Insects	olf	1.6	1.2	1.6	0.8	0.8
	ah	0.2	0.4	0.6	0.4	-
	G	1.8	1.6	2.2	1.2	0.8
Total <i>Insecta</i>	olf	262.8	196.6	123.6	108.6	14.0
	ah	20.8	80.4	20.0	28.4	21.2
	G	283.6	277.0	143.6	137.0	35.2
Other groups	olf	15.8	1.2	10.2	4.2	2.2
	ah	1.6	1.0	6.0	5.0	1.6
	G	17.4	2.2	16.2	9.0	3.8
TOTAL	olf	667.8	505.0	523.2	398.2	45.4
	ah	38.6	112.8	57.8	70.0	38.0
	G	706.4	617.8	581.0	468.2	83.4

Legend: the values represent the average of the abundance in individuals /100 cm²; olf – litter and fermentation subhorizon; ah – humiferous suborizon; G – global;

The best populated were the forests which belong to the nemoral zone - Guranda and Copălău, in the organic horizon of these being found over 50% of the whole mesofauna, of the five studied forests (*tab. 1*).

Comparing with the oak forests of the flood plain from the same zone the maximum density is now of 2.44-4.47 higher [1].

The analysis of the vertical distribution showed a bigger population of the superficial subhorizon of all studied biotopes, 54-95% of the effective population being found here (*tab. 1*).

The distribution on the taxonomic groups showed a situation usually found in the forest ecosystems [1, 6]. So, we could remark the domination of the mites in all the stations and between all these the oribatids proved to be dominated (62-80%) without exception; they are followed by gamasid mites (16-25%) and actinedids (1.4-11.3%) (*fig. 1-5*). The ratio between oribatids and collembolans – the main detritomicrophagous groups – were generally over unit and easily sub unit as in the case of Drislea station (*tab. 1, fig. 5*).

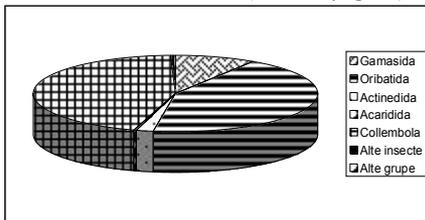


Figure 1 The weight of the main edaphic microarthropods groups - Copălău

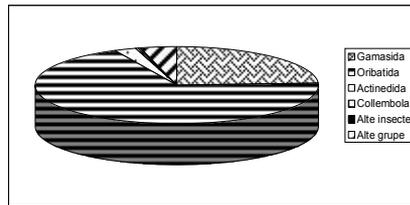


Figure 2 The weight of the main edaphic microarthropods groups – Guranda

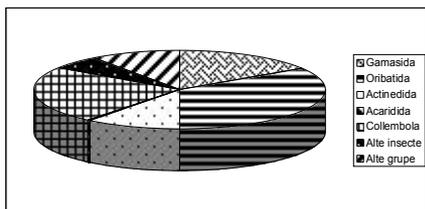


Figure 3 The weight of the main edaphic microarthropods groups – Roșcani

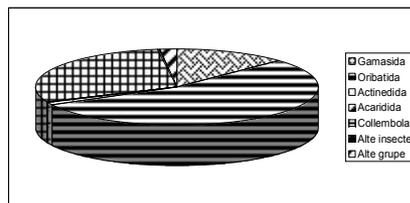


Figure 4 The weight of the main edaphic microarthropods groups – Zăicești

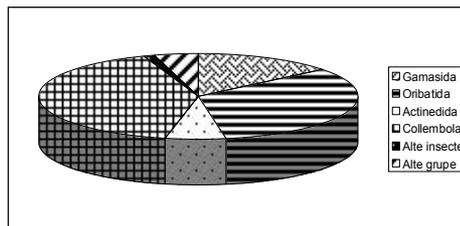


Figure 5 The weight of the main edaphic microarthropods groups – Drislea

In the studied plantations the microarthropods densities varies between 105.6-708.4 individuals/ cm² (*tab.2*). These densities are similar with those

registered in the natural forests of Moldavian Plain, but bigger than the values obtained in a series of similar plantations [1].

The analysis in individuals on taxonomical groups reveals the domination of the mites in higher rates (51-90%). Of all the mites we remarked in all the analyzed cases that the oribatids are extremely numerous, with 78-92% from the total (*tab. 2, fig. 7 -10*). The second place is taken by gamasids but only at Berza (12.93%), for the rest of the plantations this place being occupied by actinedids with a percent between 6.33% (Cinghinia) and 18% (Zăicești) (*tab. 2, fig. 6, 9, 10*). Of the total of mites fauna we see a thin representation of the acaridid mites, these being identified only in the samples from Berza (0.19%), Roșcani (0.91%) and Zăicești (0.88%) (*tab. 2, fig. 6, 7, 9*).

Table 2

Average density of the edaphic microarthropods from the studied plantations

Systematic group	Acacia			Pine		
	Berza	Roșcani	Deleni	Zăicești	Cinghinia	
<i>Gamasida</i>	olf	16,6	16	2,2	0,2	7
	ah/oh	9	2,4	4,4	3,0	1,8
	G	25,6	18,4	6,6	3,2	8,8
<i>Oribatida</i>	olf	106,6	130,2	35,4	41	492,2
	ah/oh	65	45	61,8	28,8	99
	G	171,6	175,2	97,2	69,8	591,2
<i>Actinedida</i>	olf	5,2	18,8	9,6	9	38,8
	ah/oh	3,8	4,8	6,6	7,2	1,8
	G	9	23,6	16,2	16,2	40,6
<i>Acaridida</i>	olf	0,2	0,6	-	0,6	-
	ah/oh	0,2	1,4	-	0,2	-
	G	0,4	2	-	0,8	-
Total <i>Acari</i>	olf	128,6	165,6	47,2	50,8	538
	ah/oh	78	53,6	72,8	39,2	102,6
	G	206,6	219,2	120	90	640,6
<i>Collembola</i>	olf	25,6	68,2	5,8	3,4	31,4
	ah/oh	37,2	107,2	6,8	1,6	2,6
	G	62,8	175,4	12,6	5	34
Other insects	olf	3,6	7,8	7,6	5,4	18
	ah/oh	0,8	1,2	0,4	3,2	4,8
	G	4,4	9	8	8,6	22,8
Total <i>Insecta</i>	olf	29,2	76	13,4	8,8	49,4
	ah/oh	38	108,4	7,2	4,8	7,4
	G	67,2	184,4	20,6	13,6	56,8
Other groups	olf	8,8	23,4	1	1,8	8
	ah/oh	11	5,8	1,6	0,2	3
	G	19,8	29,2	2,6	2	11

Legend: the values represent the average of the abundance in individuals /100 cm²; olf – litter and fermentation subhorizon; ah – humiferous suborizon; G – global;

The ratio oribatids/collembolans is in general over unit and only in the case of acacia plantation from Roșcani we see an exception; the collembolans are here well represented having similar densities with those of oribatids.

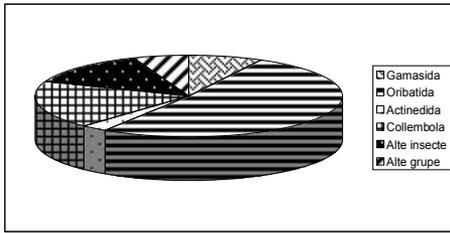


Figure 6 The weight of the main edaphic microarthropods groups - Berza

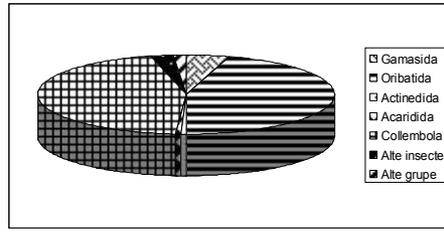


Figure 7 The weight of the main edaphic microarthropods groups - Roșcani

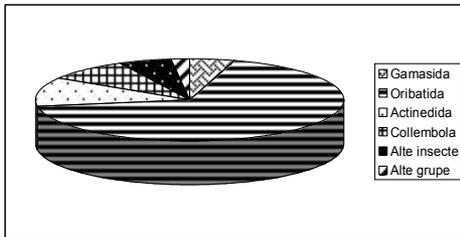


Figure 8 The weight of the main edaphic microarthropods groups - Deleni

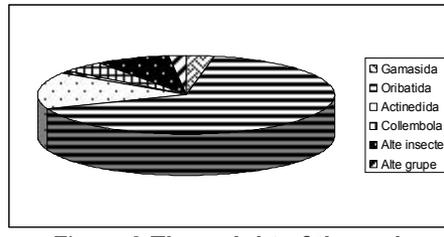


Figure 9 The weight of the main edaphic microarthropods groups – Zăicești

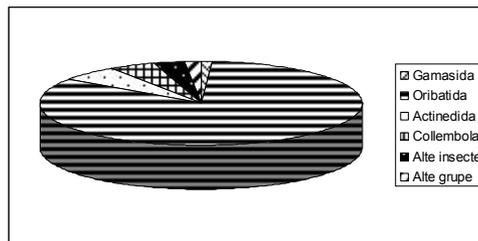


Figure 10 The weight of the main edaphic microarthropods groups - Cinghinia

The analysis of the trophic groups shows that the detritomicrophagous dominate the zoophagous, such a situation being found usually in the natural ecosystems [1, 6].

The analysis of the vertical distribution shows for the whole edaphic mesofauna a higher population of the outer subhorizon (olf) (57-84%), with the exception of Deleni plantation where approximately 57% of the whole mesofauna is in the more profound subhorizon – ah (*tab. 2*).

CONCLUSIONS

The study of the edaphic mesofauna in the organic horizon of the natural ecosystems and anthropized ones (plantations) followed both quantitative and qualitative aspects, observing that the densities of the microarthropods vary in large limits in relation with the concrete stational conditions.

The best populated proved to be the forests belonging to the nemoral zone comparing with the typical forest steppe.

The values of the densities of the microarthropods fauna from the plantations are generally comparable with those of the natural forests from the Moldavian Plain.

The distribution on the taxonomic groups showed a situation usually found in the forests ecosystems: the mites are present and dominates in all the stations, and of all these oribatids proved to be the most numerous being generally followed by gamasids and than by actinedids.

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