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The Comparison of the Vertical Distribution of the Myriapode Group (Diplopoda and Chilopoda) in Vlora Region, Albania

KEYWORDS: Ecology, diplopoda, chilopoda, vertical distribution, myriapodes.

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ABSTRACT *During the study of the Diplopoda class and Chilopoda which belong to the group Miriapoda in the sourthen region of Albania, other than their identification, we analyzed the vertical distribution in three forest areas of Vlora region. The analyses of the vertical distribution is based on the collection and determination of the groups in these stations for a one year period. We studied the distribution of the kinds on the earth surface, in the gound in depth 0-10 cm and 10-20 cm, for the three collecting stations. We also studied the numerical frequency for each determined kind, for the Diplopoda and Chilopoda class, in the three collecting stations.*

INTRODUCTION

Myriapodes are a very important group of soil species and play an important role ine the earth ecosystems, but they are more important in forest's ecosystems, for the positive activity in the soil formation and the increase of the first production of these ecosystems (C.H. Bornebush, 1930). There are only a few studies for these groups in the past. The studies are mainly done from foreign researchers, (J.P.Mauries, & al.1997), taxonomic studies that belong to diplopoda and chilopoda class. Miriapodes are creatures of soil, they hide to avoid the light and live under the leaves, under stones, under tree barks, inside the soil (Chamberlin, 1918) The study of distribution of the soil species is important in order to determine tha factors that affect this distribution.

MATERIAL AND METHODS

Our study is based on the use of stationary methods of echology. In this article we concluded and analyzed the vertical distribution of the representatives of miriapod class (diplopoda and chilopoda). We investigated three stations, which differ form each other from the vegetation point of view. We analyzed 313 individuals. The surface studies was 625 cm^2 because these species are clasified as macrocreatures of earth.

The first station was inside the national park of Llogara, 50 km in the south of Vlora city, 900 m above the sea level. The plant habitat was dominated from Pinus leucodermis, Pinus nigra, Abies borissiregis.

The second station was in the forest, which was dominated from quercus, 15 km in the east of ancient Oric city, 300 m above the sea level.

The third city was the national park of Butrinti, around 20 km in the south of Saranda city. There is a high percentage of organic material here, with plant residues, trees and leaves all decomposing.

The material is collected by sample collection. The study is done in three different collecting stations for each of the samples. The distribution of the kinds of myriapodes class depends greatly from the temperature and wetness combination. Therefore, each collecting station is visited three times during 2012, in spring, summer and fall. We analyzed 27 samples, 9 samples for each collecting station. The samples are taken on the earth surface, under the surface 0-10 cm and in the depth 10-20 cm. The sample taken is cleaned from the plant materials, the leaves and decomposing tree branches and we extracted all the individuals (diplopoda and chilopoda) that were there. To collect the material we used the hand collecting method, and in the deep area we sieved the soil, especially in the summer when the individual have the tendency to go deep in the ground for the temperatures and the proper wetness.

In the proper depth of 0-10 cm we took the soil, collected the visible individuals with hand and then sieved the soil.

The same procedure was done for the 10-20 cm depth. The material collected was put in the bottles filled with ethyl alcohol 75%. We analyzed the collected materials. In their determination we took into consideration: body size, the number of segments and pairs of extremities, gonopode's study, the body color, the form of their cover, the tergal plates etc. the further determination of the close kinds is based in extraction and comparison of the gonopodes according to the determination key of Mauries J. (Lab. de Arthropodes, MNHN Paris), by using the stereomicroscope EMZ13TR, Trinocular Zoom, Stereo on PK Stand Zoom Range: 10x to 70x.

RESULTS AND DISCUSSIONS

During the study we collected 313 individuals. The results are presented in table 1 and 2. The collected material defined belongs to 2 myriapodes classes, diplopoda with three kinds and chilopoda with three kinds too.

Table 1.The distribution of diplopoda in leaf-litter and soil as the investigated stations

	Taxonomic units	Tragjas	Llogara	Butrint	Total
	Class DIPLOPODA	67	56	50	178
	Order GLOMERIDA	22	20	26	68
1	Glomeris pulchra	7	8	11	26
2	Glomeris bureschi	4	5	6	15
3	Glomeris pustullata	6	-	9	22
4	Glomeris latermarginata	-	5	-	5
	Order JULIDA	25	46	24	95
5	Pachyiulus cattarensis	5	-	6	11
6	Anoploiulus pusillus	-	11	2	13
7	Megaphyllum karschi	-	7	-	7

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8	Ommatoiulus sabulosus	-	13	7	20
9	Cylindroiulus boleti	7	-	-	7
10	Leptoiulus trilineatus	13	6	9	28
11	Typhloiulus albanichus	-	9	-	9
	Order POLYDESMIDA	25	5	-	30
12	Polydesmus complanatus	-	5	-	5
13	Strongylosoma stigmatosum	25	-	-	25

Table 2. Abondance of chilopoda in leaf- litter and soil as the investigated stations

	Taxonomic units	Tragjas	Llogara	Butrint	Total
	Class Chilopoda	42	50	61	153
	Order GEOPHILOMORPHA	23	25	25	73
1	Henia illyrica	3	-	-	3
2	Strigamia transsilvanica	6	8	9	23
3	Clinopodes flavidus	-	-	4	4
4	Geophilius sp.	14	17	12	43
	Order SCOLOPENDROMORPHA	7	3	5	15
5	Scolopendra cingulata	7	3	5	15
	Order LITHOBIOMORPHA	12	22	31	65
6	Eulithobius litoralis	3	7	-	10
7	Lithobius forficatus	9	7	11	27
8	Lithobius lapidicola	-	3	-	3
9	Lithobius mutabilis	-	-	3	3
10	Lithobius microps	-	5	17	22

In the process of analyzing the species found in three investigated stations, we noticed that these classes are presented by 23 species, 13 millipede (diplopoda) and 10 centipede (chilopoda). In the three stations, the order Julida is presented by the highest of the species, and also the highest frequency of the individuals. The order Polydesmida is presented in two stations, Butrint and Llogara with a very low number of individuals. The Order Glomerida is also found in the three stations, with higher frequency in Butrint and Llogara.

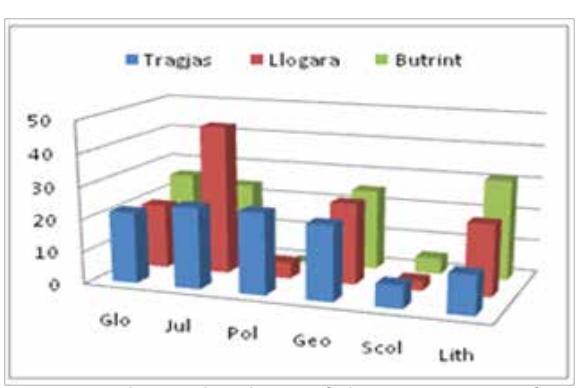

Figure 1: Relative abundance of the main groups of Diplopoda and Chilopoda at the three investigated stations

The collected data show that the microclimate elements, the edaphic material and vegetation for each biotope are the main factors that affect the distribution of myriapodes kinds. The environmental conditions and the soil structure affect the vertical distribution of earth creatures (GAVA 1991)

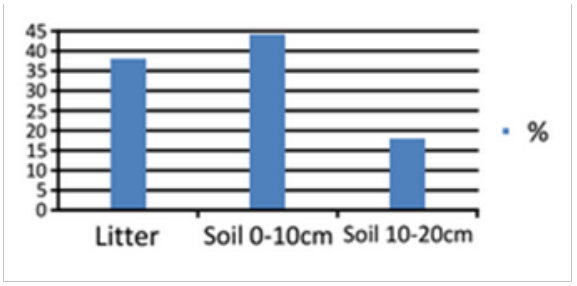

Figure 2: The vertical distribution of the main groups of diplopode and chilopode for three investigated stations

There is a balance of the individual frequency in the soil surface and in the depth of 0-10 cm, with a growing tendency of tha last depth. Their vertical distribution is affected by the combination of temperature and wetness (Kime & al 2000). Also the cuticle strucure affects their distribution (Blower, 1955); Koleff & al 2003) . Therefore, Polydesmidas cuticle is hard and can handle the bad weather conditiond of temperature and drought, different from.

Glomerida and Julinda. The latest exploit the ability of the movement and pushing the soil with their head in order to penetrate in the deep of earth surface (G. Chiefi,1978). This is more obvious in Tragjas station, as the environment where the samples are taken from, is bare from vegetation.

The species of Chilopoda class are also distributed in all the earth surface and in the depth of 10 cm. The presence of high number of individuals of Chilopode class further down, compared to other kinds of diplopodes, is related to their fast movement in the collection moment (G. Chiefi,1978). In Llogara station, 1000 m above the sea level, the temperatures in the time of collection are lower than the other two stations (Qiriazi, P 1991; ASH, 1991). This makes it possible for the creatures to move toward the earth surface, under the leaves, under the trees, through the decomposed organic material. For the two calsses in the study the populations in the 10-20 cm depth is not higher than 18%, meanwhile in the earth surface and the depth of 0-10 cm the relative frequency is 38% and 47% respectively. Analyzing the relative frequency in the three investigated stations, we noted that in the forst station (Tragjas), there is an increasing tedency of the individual numbers in the level 0-10 cm. This because of the fact that the environment in the collecing stations is bare of vegetation, and also the organic decomposing material is less. The graphics 2, 3, and 4 show the relative frequency of the three soil levels for three collecting stations.

In the following graphics the name of the species is given with contractions:

Glomeris pulchra (Gpu), Glomeris bureschi (Gbu), Glomeris pustullata(Gps), Glomeris latermarginata (Glm), Pachyiulus cattarensis (Pct), Anoploiulus pusillus (Apu), Megaphyllum karschi (Mka), Ommatoiulus sabulosus, Cylindroiulus boleti, Leptoiulus trilineatus, Typhloiulus albanichus, Polydesmus complanatus (Pco), Strongylosoma stigmatosum (Sst), Henia illyrica (Hil), Strigamia transsilvanica (Str), Clinopodes

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flavidus (Cfl), Geophilius sp. (G.sp), Scolopendra cingulata (Sci), Eulithobius litoralis (Eli), Lithobius forficatus (Lfo), Lithobius lapidicola (Lla), Lithobius mutabilis (Lmu), Lithobiusmicrops (Lmi).

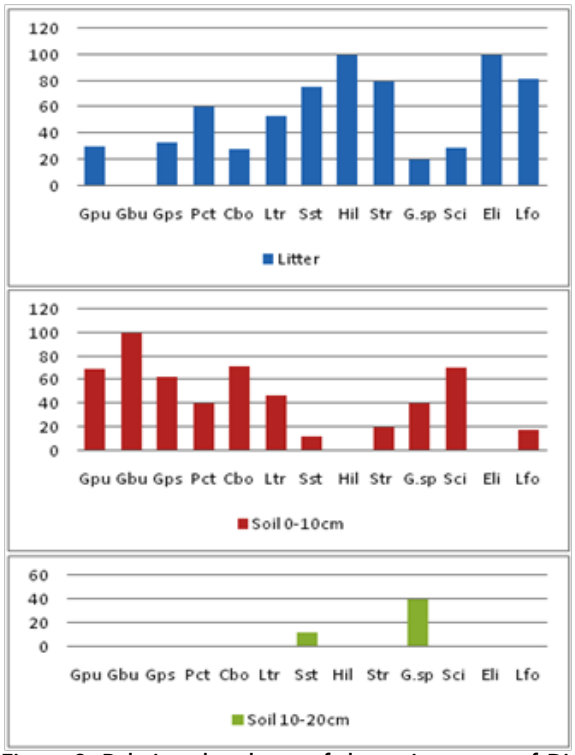

Figure 3: Relative abundance of the main groups of Diplopoda and Chilopodane in Tragjas collecting station

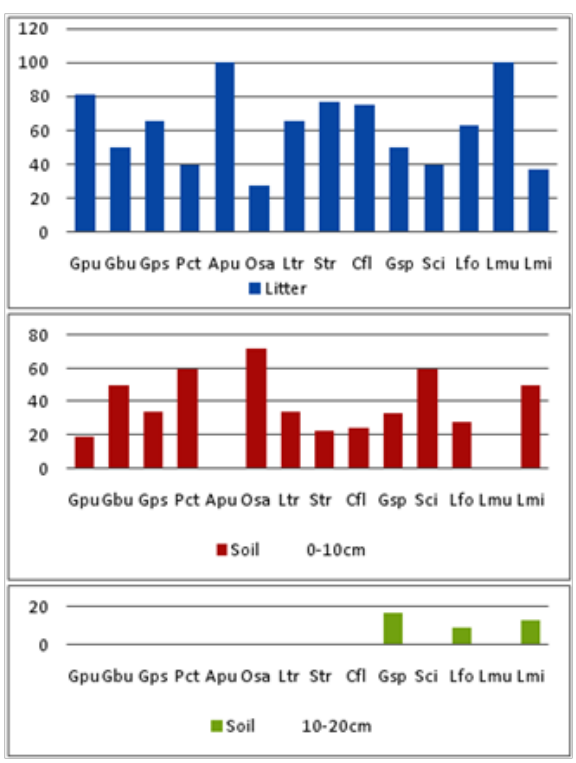

Figure 4: Relative abundance of the main groups of Diplopoda and Chilopodane in Llogara collecting station

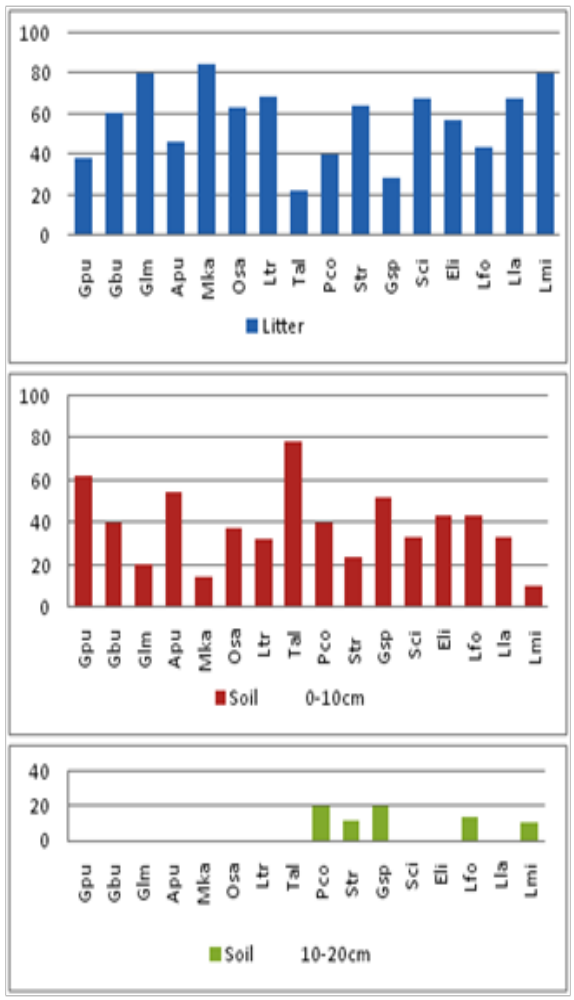

Figure 5: Relative abundance of the main groups of Diplopoda and Chilopoda in Butrint collecting station

Different species have various vertical distributions (fig. 3,4,5,6).

As a summary, the relative frequency of the species of the two studied classes Diplopoda and chilopoda, is presented in the following graphic:

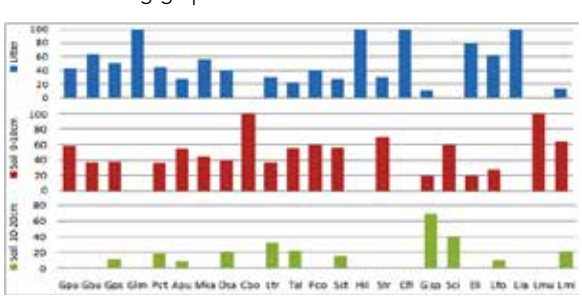

Figure 6: Relative abundance of the main groups of Diplopoda and Chilopoda at the three investigated stations

By analyzing the frequency according to the kinds we notice:

The first group are the kinds that live mostly near the earth surface as Glomeris latermarginata;Henia illyrica; Clinopodes flavidus; Lithobius lapidicola.

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The second group are the kinds that live mostly in the depth 0-10 cm as Cylindroiulus boleti; Lithobius mutabilis.

The third group are the kinds that live under 10-20 cm inside the soil with high frequency as Ommatoiulus sabulosus, Leptoiulus trilineatus; Geophilius sp.; Scolopendra cingulata.

The forth group are the kinds that have irregular distribution in the three investigated levels, mainly with balanced frequency mainly balanced in the first two levels.

CONCLUSSIONS

The highest frequency of Millipedes is noted in the soil level of 0-10 cm, in the surface and less in the depth 10-20 cm. In Butrinti station, the number of kinds found in the depth 10-20 cm is higher than in two other stations. The soil structure, its ventilation and, the high organic materials are some of the distribution factors of the kinds in this level. The analyses of the relative frequency in the study done, shows the sensitivity of these kinds to the temperature and wetness. In the bare stations the number of individuals in the second and third level is higher which s related to the temperature and wetness. The cuticle structure has an impact on the frequency of distribution of diplopodes for example polydesmida have cuticle with fatty structure which makes them more resistent than Glomerides and Julidet.

The vertical distribution of Miriapodes is different. In this distribution we notice kind preferences, but we can not exclude random distributions of the soil.

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