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VYBRANÉ SKUPINY EPIGEICKEJ MAKROFAUNY (OPILIONIDA, DIPLOPODA A CHILOPODA) AKO INDIKÁTORY STAVU VRCHNEJ PÔDNEJ VRSTVY V PODHORSKEJ BUČINE

Vydala Technická univerzita vo Zvolene

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OBSAH

1. ÚVOD A CIELE PRÁCE	7
2. PREHLAD RIEŠENEJ PROBLEMATIKY	9
3. CHARAKTERISTIKA ÚZEMIA	12
4. METÓDY	21
5. VÝSLEDKY A DISKUSIA	23
5.1 Faunistický rozbor	35
5.2 Porovnanie použitých metód	47
5.3 Vplyv environmentálnych faktorov na štruktúru vybraných taxocenóz.....	61
6. ZÁVER	73
7. SUMMARY	76
8. LITERATÚRA	79

7. SUMMARY

The work brings the results of studies on the chosen groups of the epigeic macrofauna in submontane beech forests. Besides acquiring the basic knowledge of their species spectra, both the most common methods of epigeic macrofauna research (method of pitfall trapping and square method) were compared in terms of their effectiveness and objectivity, and the bioindication potential of chosen taxonomic groups of forest litter macrofauna (Opilionida, Diplopoda, Chilopoda) was evaluated from viewpoints of their application in the monitoring of the quality of environmental.

In total, 23,796 individuals of the epigeic macrofauna were obtained during the two years of investigations (12,950 individuals in 1997 and 10,846 individuals in 1998). These individuals belong to 6 classes (Gastropoda, Arachnoidea, Malacostraca, Diplopoda, Chilopoda and Hexapoda) and 22 orders of invertebrates.

Specimens from 17 selected orders (that represented 26.7 % of all collected material) were used for species-level taxonomic identification during which 75 species from 53 genera and 33 families were identified. Several species rare in Slovakia were identified: *Dicranolasma scabrum* (Opilionida), *Julus curvicornis* (Diplopoda), *Geophilus insculptus* and *Clinopodes linearis* (Chilopoda).

The methods used in the collection of the epigeic macrofauna gave the different information about the structure and the dynamics of individual groups. From viewpoints of the total amount of the obtained material and the ascertained diversity of species, the method of pitfall trapping was more appropriate in all the investigated groups with an exception of Chilopoda. Concerning the fact that in the last mentioned group the complete spectrum of species was not perceived using this method, it seems to be more convenient to combine it with the method of squares during the faunistic research.

The similarity of stationary plots and the influence of chosen environmental factors on the investigated species were analysed only from the data achieved by the method of pitfall trapping.

The similarity of stationaires was evaluated by the cluster analysis based on the data of the total epigeic activity of species on individual plots during the entire period of investigations and by the PCA analysis based on the data of species abundance in individual months on the stationaires marked as S1 to S4.

Both methods separated stationaire S1 from the other stationaires as the most different in terms of the community structure. The cluster analysis identified two distinct groups of stationaires. The first group was formed by stationaires S2 and S3, while the second was formed only by stationaire S1. The stationaires S2 and S4 were most similar, while the stationaire S3 was grouped with them as less similar.

On the other hand, three independent aggregations were separated after the analysis of the similarity of individual samples using the PCA analysis. The first aggregation was formed by the samples from the stationaire S1, the second one contained the samples from S2–S4 and the third cluster consisted of the samples that had been carried out on all the stationaires in April, 1997. The cause of the separation of these samples (carried out on the different stationaires during the short time span) from the others consists probably in the very low total epigeic activity of macroepigeon at that time.

On the S1 stationaire, the community of the epigeic macrofauna was characterized by the occurrence of species like *Oligolophus tridens*, *Trogulus nepaeformis*, *Lophopilio palpinalis*, *Nemastoma lugubre* (Opilionida), *Glomeris hexasticha*, *Polydesmus complanatus* (Diplopoda) and *Lithobius mutabilis* (Chilopoda). On the other hand, the occurrence of *Lithobius forficatus* and *Lithobius mutabilis* (Chilopoda) was typical for the plots S2–S4. Finally, the occurrence of *Dicranolasma scabrum* (Opilionida) and *Polydesmus complanatus* (Diplopoda) was characteristic of S3—the fact that perhaps influenced the smaller similarity and the partial separation of this stationaire from S2 and S4.

The separation of stationaire S1 from all the other stationaires by both analyses is apparently due to the different environmental conditions at this stationaire. While stationaire S1 had the lowest stocking and tree crown cover of all the stationaires, it was the only stationaire where a compact understory of a new generation of trees developed underneath the main canopy. The thick understory was likely to significantly influence the microclimatic characteristics of the soil surface layers. Based on our results we can conclude that thinning within the main canopy of submontane beech forests may significantly influence the structure of studied communities of epigeic macrofauna in the long-term only when intensive thinning is used and stocking is reduced to 0.5 or less.

The influence of the environment on the structure of the communities of epigeic macrofauna was evaluated in order to appreciate how 12 chosen environmental factors influences the occurrence of individual observed taxa. However, the close correlation (at the significant level of 0.05) between the epigeic activity and some of the investigated factors was ascertained only in 13 species (from the total number of 34). The epigeic activity of species was in a relatively close positive correlation to the content of potassium in the soil (besides the negative correlation to that of CaCO_3) only in case of *Lithobius forficatus* (Chilopoda). Similarly, the relatively close positive relationship between the epigeic activity and the acidity of forest litter was detected only in *Strigamia crassipes* (Chilopoda). On the other hand, the most frequent was the close correlation between the epigeic activity of individual species and the content of CaCO_3 in the soil (in 6 species) or the acidity of forest litter (in 5 species). Besides that, the influence of the content of forest humus and carbon on the abundance of species was confirmed in cases of *Leiobunum rupestre*, *Platybunus bucephalus* (Opilionida), *Lithobius austriacus*, *Lithobius dentatus*, *Lithobius lapidicola* (Chilopoda) and *Polyzonium germanicum* (Diplopoda). The epigeic activity of species was in the positive correlation to the soil humidity in *Polydesmus complanatus* (Diplopoda), to the temperature in *Glomeris hexasticha* (Diplopoda), to the soil acidity in *Lithobius mutabilis* (Chilopoda) and finally, to the forest litter acidity in *Lithobius aeruginosus* (Chilopoda). Contrariwise, the negative correlations were ascertained between the humidity of forest litter and the epigeic activity of *Trogulus nepaeformis* (Opilionida), and between the soil humidity and the epigeic activity of *Strigamia acuminata* and *Cryptops parisi* (Chilopoda).

The most reliable indicator of stand stocking proved to be the abundance of *Oligolophus tridens* (Opilionida), which showed a distinct gradient of diminishing numbers of individuals trapped into a single ground trap in a 24 hour period as the stocking of the stand increased.

Based on the results presented in this work, as well as the results of other authors, we can conclude that many species of epigeic macrofauna have specific environmental requirements and are sensitive indicators of the quality of the environment. Their use for bioassays in monitoring the state of the environment requires a detailed analysis of the requirements of the individual species in respect to as many environmental factors as possible. Attempts to describe general relationships of entire groups of epigeic macrofauna relative to particular environmental conditions are not sufficient.

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