Study sites in Tatra National Park and their acarofauna

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Abstract. Soil mites on area of TANAP damaged by wind (2004), fire and human influence were studied during the years 2007-2010. Four sites were explored, three of them influenced and one without any impact. Species spectrum, taxocoenose structure and species diversity of mites were studied and differences between these study sites were evaluated and compared.

Introduction

From mountain Norvay spruce forests in High Tatra Mts. preponderantly faunistic papers are available from the past, dealing with some families of soil mites, however, regardless of habitat types and also influence of natural disturbances (DANIEL 1974, HALAŠKOVÁ 1974, MRCIAK 1974, MAŠÁN 2001). During the last years soil mites have been studied there more intensively in various types of habitats impacted by natural and human factors (KALÚZ a FERENČÍK 2009).

Data and methods

The research widely focused on habitat preferences and community structure of soil mites ran in TANAP during the years 2007-2010. Four study sites were explored: NEX - Tatranská Lomnica-Jamy – area damaged by windstorm, not extracted wood material; EXT - Nová Polianka-Danielov dom – area damaged by windstorm, extracted wood material; FIR - Tatranské Zruby-Zhorenisko – area damaged by windstorm and fire; REF - Vyšné Hágy-Smrekovec – not influenced spruce forest.

Soil samples of standard volume (10x10x5cm – the year 2007; 4x5x10 cm – 2008-2010) were taken from study sites from May to September (10 samples in each site during each field work). Samples were taken from spruce litter, grass, *Calamagrostis villosa*, *Vaccinium myrtillus* moss, *Calluna vulgaris* and *Chamaerion angustifolium*. Mites were isolated in high-gradient fotoeclectors, preserved in 70% ethyl alcohol and mounted into permanent slides using Liquido de Swann, then were identified microscopically.

Results and discussion

Mite taxocoenoses in particular habitats were characterized and compared against each other. Exposed bare soil hosted a few mite species only. They were represented by mobile species associated with neighbouring habitats covered with vegetation. The rhizosphere of dense layer of *Chamerion angustifolium* in the forest affected by the wind and timber removal, and in the forest affected by the wind, timber removal and forest fire, was inhabited by less mite species than the rhizosphere of species-richer plant community with low share of *Chamerion angustifolium* in the wind-affected forest where timber has been left unsalvaged. In the forest with salvaged timber and, also, in the fire affected (burnt) forest, much greater share of meadow as well as mobile mite species was recorded in comparison with the forest with unsalvaged timber

where impacts on soil were shown to be less destructive. Thick spruce litter in the forest not affected by the wind and, also, in the forest with wind-felled trees (timber) left unsalvaged, hosted a few mite species only. Here, also, species richness of mite taxocoenoses associated with the rhizosphere of bilberry (*Vaccinium myrtillus*) was low. In contrast, the rhizosphere of bilberry in the forest affected by the wind and timber removal and in the forest additionally impacted by the forest fire hosted more mite species. The rhizosphere of numerous herbaceous plant species in the wind-affected forest supported less mite species than the rhizosphere in the forest not affected by the wind. However, in the rhizosphere of grasses dominated by *Calamagrostis villosa* in the wind-affected forest more mite species were recorded. In species-rich plant communities and, also, in the plant community with prevalence of *Calamagrostis villosa*, mite species associated with meadow habitats predominated. Species diversity was highest in habitats with low herb layer in the not affected forest. Here, also, the highest mite density was documented, whereas the lowest density of mites was typical for the wind-affected forest with salvaged timber. The structure of mite taxocenoses in plant areas of TANAP is also similar to those of Malá Fatra Mts. (KALÚZ & ŽUFFA 1986, 1988). Some species found there were considered before an exclusively forest species.

Conclusion

The greatest differences in species diversity over time were documented in the forest affected by the timber removal and/or forest fire, lowest differences were documented in the forest not affected by the wind. The mite forest taxocoenoses in damaged area have the tendence relatively quickly change their structure towards a meadow taxocoenoses with more ecologically adaptable species.

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References

DANIEL, M. 1974: Trombiculidae. In: ZMORAY I. (ed.), Fauna Tatranského národného parku, Zborník prác o Tatranskom národnom parku, 16, Osveta, Martin, p. 95.

HALAŠKOVÁ, V. 1974: Zerconidae. In: ZMORAY I. (ed.), Fauna Tatranského národného parku. Zborník prác o Tatranskom národnom parku, 16. Osveta, Martin, p. 87–88.

KALÚZ, S., FERENČÍK, J. 2008: Pôdne roztoče (Acari) kalamitných plôch vo Vysokých Tatrách, In: FLEISCHER, P., MATEJKA, F. (eds.), Zborník príspevkov Pokalamitný výskum v TANAP-e, p.108–119.

KALÚZ, S., ŽUFFA, M. 1986: Voľne žijúce pôdne roztoče (Acarina) Štátnej prírodnej rezervácie Šrámková (Malá Fatra). Ochrana prírody, Bratislava, 7: 375–387.

KALÚZ, S., ŽUFFA, M. 1988: Pôdne roztoče (Acarina) Štátnej prírodnej rezervácie Kľačianska Magura (Malá Fatra). Ochrana prírody, 9: 273–280.

MAŠÁN, P. 2001: Roztoče kohorty Uropodina (Acarina, Mesostigmata) Slovenska. Annotationes Zoologicae et Botanicae, SNM, Bratislava, 320 pp.

MRCIAK, M. 1974: Gamasoidea. In: ZMORAY I. (ed.), Fauna Tatranského národného parku, Zborník prác o Tatranskom národnom parku, 16., Osveta, Martin, p. 89–94.