

## EFFECT OF MACROPLASTIC ON SOIL INVERTEBRATES: A CASE STUDY USING MORPHOLOGICAL AND MOLECULAR APPROACHES

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**Abstract.** Soil contamination by plastic is a global problem. Most experimental studies focus on microplastics, but large fragments, such as a variety of packaging and plastic bags, make up a significant component of plastic pollution. The effects of large fragments of household plastic debris on soil invertebrate communities are largely unexplored. The use of metabarcoding can greatly simplify the assessment of the taxonomic composition of soil invertebrates as well as their symbionts and parasites. However, the method is still underdeveloped and requires verification by classical approaches. We used metabarcoding and the traditional approach based on the morphological identification of invertebrates in assessing the effect of macroplastics on soil animal communities. Fragments of transparent or black polyethylene film measuring 40 × 40 cm were fixed on the soil surface in four forest ecosystems. After 9 months, the total abundance of mesofauna in general and individual groups of invertebrates (Collembola, Mesostigmata) was significantly reduced in the soil under the film compared to the control plots. The presence of the film did not affect the abundance of macrofauna, but in some biotopes the abundance of Isopoda, Hemiptera and Chilopoda increased and the number of Coleoptera and Diptera larvae decreased under the plastic film. The applied modification of metabarcoding revealed a significantly lower diversity of invertebrates (66 families, 105 genera) compared to the morphological method of identification (95 families, 127 genera). Wolbachia and Rickettsia, typical endosymbionts of invertebrates, but not other common parasites, were noted. In contrast to the morphological method of determination, metabarcoding revealed no significant differences in the taxonomic composition of invertebrates in the soil under the film and in the control soil. However, the significant correlation between the results of morphological identification and metabarcoding confirms the ability of metabarcoding to detect even small changes in the taxonomic composition of soil invertebrate communities.

**Keywords:** soil fauna, metabarcoding, OTU, ASV, plastic pollution, forest ecosystems, macrofauna, mesofauna, community structure

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