# Abstract

Presented diploma thesis focuses on a new type of lightweight polyurethane foam (PUR), which has been manufactured with the intention of it being biodegradable within currently valid norms on biodegradation of plastic materials. The future use of said polyurethane foam is as carrier for odor repellent to avoid wildlife-vehicle collisions in agriculture landscape, where, after the end of its lifespan it could be left to biodegrade in soil the environment.

The examined material, PUR BIO-10, was tested for biodegradability in laboratory microcosms according to standardized method ASTM D5988-03. Biodegradability was tested in two separate soil types – forest soil and agricultural soil, which have been selected with the future use of the material in mind. According to the method biodegradability was measured as mineralization of the material by capturing evolved carbon dioxide. During the first trial the mineralization of polyurethane foam was 10.65 ± 2.54 % in the forest soil and 20.48 ± 9.18 % in the agricultural soil. During the second trial the mineralization was 3.88 ± 3.42 % in the forest soil and 8.96 ± 1.79 % in the agricultural soil. In the second trial the difference between the soils was statistically significant.

After the end of the biodegradation experiments the tested material was extracted from the microcosms and further tested with analysis of phospholipid fatty acids (PLFA analysis). Said analysis is used for screening of microbial communities and specifically in this case it should provide information about which groups of microbial community have been present on the tested material during extraction and presumably participated in the biodegradation. During the first trial the tested material was placed directly into the soil and after data evaluation the forest and agricultural soil samples did not differ in their microbial community composition. During the second trial the material was kept in a litterbag, which was used as a protection of the material from contamination by soil, which could cause a distortion of results from the PLFA analysis. After the second trial data evaluation it was found that the forest soil microbial community, especially fungi, have been statistically significantly more present on the tested material.



**Key words:** lightweight polyurethanes, biodegradation, PLFA, microbial communities