The Biodegradation of Styrofoam Using Invertebrates-- The Third/Fourth Research: The Impact of Superworms (Zophobas morio) on the Biodegradation of Different Types of Styrofoam

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The polystyrene cups annually thrown away by the Americans could circle the Earth 436 times. The 500 years of degradation makes styrofoam the problem of the future; however, the styrene - leading to hearing loss and leaching into food from foam containers - is already present in each human adipose tissue. Analyses of high-cost laboratory decomposition led to the presented study of correlations between superworms (Zophobas morio) population density and the efficiency of degradation of styrofoam. Superworm (Zophobas morio) larvae, in number from 1 to 5, were placed in 100 ml urine sample containers with manually perforated lids, to which blocks of polystyrene insulation of two types - differing in the presence of a flame retardant (BS: without, BF: including) - were added. During 6 weeks the frequency of cannibalism, metamorphoses and the differences in behaviour were daily observed and the mass of styrofoam was weekly measured with laboratory balance. After given period there were 56.8% and 28.6 % left alive larvae, 92.5% and 39% left alive individuals, 57.65% and 54.11% of styrofoam consumed in BS and BF 4-individual containers respectively, which is presented as the biggest figures, excluding exceptions. The proportion between alive larvae - the only metamorphic stage degrading EPS - and the percentage of decomposition suggests that 4 individuals per container under given conditions provide the most efficient biodegradation and enables to determine coefficients based on initial styrofoam weight and invertebrates' biomass. The flame retardant probably enriches nutritional values of EPS, thus blocks in BF were less consumed. Further research, including microbial recycling of waste - therefore resulting in a closed-loop process - is planned.

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