
Effects of microplastics on earthworms in agricultural soil: comparison of traditional and biodegradable plastics

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Abstract

The aim of our research is to study long-term effects of microplastics and plastic additives on earthworms in agricultural soil. Our research started in January 2022. The study focuses on plastics used in agriculture and compares possible differences between biodegradable and non-degradable plastics. The research plan includes several laboratory tests with different types of plastics and plastic additives and a field study.

We have preformed the standard ecotoxicological tests with earthworms for two different plastic types. From these standard tests we have selected juvenile earthworms for new set of tests to study, do young earthworms react differently to plastic contamination of soil compared to fully grown individuals used in standardised tests. Our aim is to study how fast the worms will grow and when they reach full sexual maturity in soil with different concentrations of different types of plastics. In addition to survivability, growth and reproduction we also study uptake of plastics by earthworms, uptake of plastic additives and oxidative stress in earthworms caused by different plastic concentrations in tests soils.

In the field study we will artificially contaminate several boxes of soil with different concentrations of plastics. We use two kinds of plastic types, biodegradable and non-degradable. Plastic is applied as fine microplastic powder. The plastic is applied to agricultural research field. Crops are planted in the field in spring. We will take soil samples to define characteristics of the soil. In autumn earthworm community samples are taken from the field and effects of the microplastic addition to earthworm community is observed.

Currently we have some preliminary data from the laboratory studies. High plastic concentrations seem to have an effect on the growth of the earthworms, but long-term experiments has just started and more datapoints are needed. Earthworm samples from the field study will be taken during September 2022.

Keywords: Microplastics, biodegradable, ecotoxicology, earthworms

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