

The aim of this study is to investigate the effect of microplastics (MPs) on the biodegradation activity of microscopic soil fungi and fungal-plant interactions. Plastic mulch films are intensively used in agriculture to suppress weed growth, prevent moisture loss, and improve crop yield. On the other hand, urban sewage sludge containing microplastic particles are used to fertilize soil. These particles pollute agriculture soil and could affect the soil ecosystem. As a result of human activity in agriculture soil can be also found heavy metals and pesticides. Fungi are an important component of terrestrial ecology. Many of them have a positive (e.g. *Trichoderma* spp.) or negative (e.g. *Fusarium* spp.) effect on plant health, which is of major importance for human economy. The planned research on the impact of plastics on the plant growth in the presence of fungi has an innovative character.

In the present project we hypothesize that MPs affect biodegradation activity of fungi and fungal-plant interactions. To test our hypothesis we will observed (1) whether fungal activities expressed as their biodegradation potential towards herbicides in heavy metals presence are modified in the environment polluted of MPs as compared to control settings, (2) whether microplastic particles have effect on parallel interactions between wheat (*Triticum aestivum*) and the fungi *Trichoderma* spp. and/or *Fusarium* spp..

We also hypothesized that microplastics, apart from the fact that it will affect the interaction between fungi and wheat, it will have an impact on plant growth, germination, chlorophyll content and accumulation of metals (Zn and Cu) and will be bound by wheat itself.

Microplastics have been defined as particles smaller than 5 mm, while particles with dimensions smaller than 0.1 μm , are referred to as nanoplastics. MPs particles are ubiquitous in the atmosphere, water and soil and they can be easily incorporated into food webs. In addition, they may serve as a vector for pathogens, organic pollutants, heavy metals or other contaminants.

A critical goal for studies is answering the question whether MPs negatively affect plant growth-promoting microorganisms or whether they increase the prevalence of plant disease causing organisms (i.e. pathogenic *Fusarium* species). Therefore in this project, two fungal species will be selected. One of them will be *Trichoderma harzianum*, a species which is effective against a broad spectrum of soilborne plant pathogenic fungi, bacteria and nematodes in a number of crop species. The second one will be a well-known wheat and other cereals pathogen *Fusarium culmorum*.

The planned research, using both Petri dishes and then greenhouse pot experiments with the soil in order to examine the impact of MPs on fungal activity and fungus-plant interactions has an innovative character.

The effects of MPs on soil fungi remain largely unexplored and represent a relevant area for future research. The data obtained will expand our knowledge of the influence of MPs on terrestrial microorganisms and their effects on plants.