

Effect of microplastics on the ecotoxicity of Pb

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ABSTRACT

Microplastics are small pieces of plastic less than 5 mm in size. In an agricultural environment, plastic films are widely used for greenhouses and mulching films. These plastic films can generate microplastics. Previous studies have reported that microplastics present in environmental media can act as vectors for environmental pollutants, and this can pose a threat to the ecosystem. In addition, the agricultural environment can be contaminated with heavy metals such as lead (Pb), mercury (Hg), and cadmium (Cd) due to various human activities. The fate of heavy metals in the agricultural environment can be affected by the microplastics (Lin 2021). Therefore, this study investigated the potential effect of microplastics on the fate of heavy metals. Different types of plastics (polyethylene (PE), polyvinyl chloride (PVC), polystyrene (PS)) were used to study the sorption characteristics of Pb on the microplastics. Also, the changes in the ecotoxicity of the Pb solution in the presence of the microplastics were determined by using the Microtox bioassay. Sorption experiments were carried out using PE, PVC, or PS pellets (<125 µm) and Pb solutions (0-10 ppm). After the 48 h-sorption period, the residual Pb concentrations were measured and the results were fitted to the Langmuir and Freundlich isotherm models. The results show that Pb was adsorbed on microplastics, and the ecotoxicity of Pb was reduced in the presence of microplastics. These suggest that the ecotoxicity of environmental pollutants can be affected by the presence of microplastics. Therefore, further research is needed on the effect of microplastics on ecotoxicity of environmental pollutants.

REFERENCES

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