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BSc./MSc. thesis topic

Microplastics analysis and uptake into plants

Terrestrial systems accumulate nano and microplastics but are understudied. Studies involving the detection and fate of microplastics in soil and in terrestrial ecosystems are still scarce. The same is true for studies examining uptake and incorporation of microplastics into plants.
For food crops, sewage sludge can be applied as fertilizers but it can be a sink for microplastics leading to an increased presence of microplastics in agricultural soils. Currently, there are no threshold values for microplastics in soils leading to a negative impact on soil quality. However, there is evidence for some severe negative effects on soils and plants (Fig. 1).
This thesis should examine sewage sludge and compost from local distributors for its microplastics presence and content. In a next step, sewage sludge and compost will be applied as fertilizer in a greenhouse pot experiment with agricultural crops. Here, the thesis should examine a potential uptake of microplastics stemming from the applied sewage sludge or compost. Greenhouse experiments will be setup during the vegetation period in Nossen at the LfULG's greenhouse facility.

Requirements

- Interest in lab and greenhouse work
- Interest in working with plants
- Statistical analysis of the results

Supervision

Cover Prof. Dr. Natalie Orlowski

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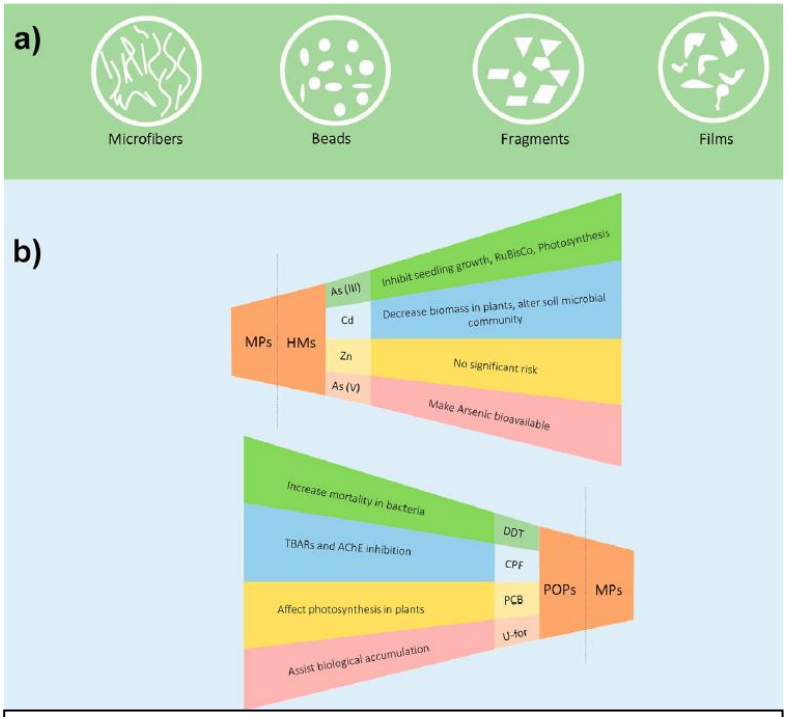

Fig. 1: a) Different types of microplastics (MPs); b) interaction of inorganic and organic pollutants with MPs impact plants and soil-dwelling organisms. Heavy metals (HMs), persistent organic pollutants (POPs), arsenic (As), Cadmium (Cd), Zinc (Zn), and others. (Khalid et al., 2020).

Literature

Application as a Vehicle for Microplastics in Eastern Spanish Agricultural Soils". *Environmental Pollution* 261 (1. Juni 2020): 114198. https://doi.org/10.1016/j.envpol.2020.114198.

Bosker, Thijs, Lotte J. Bouwman, Nadja R. Brun, Paul Behrens, und Martina G. Vijver. „Microplastics Accumulate on Pores in Seed Capsule and Delay Germination and Root Growth of the Terrestrial Vascular Plant Lepidium Sativum". *Chemosphere* 226 (1. Juli 2019): 774–81. https://doi.org/10.1016/j.chemosphere.2019.03.163.

Khalid, Noreen, Muhammad Aqeel, und Ali Noman. „Microplastics Could Be a Threat to Plants in Terrestrial Systems Directly or Indirectly". *Environmental Pollution* 267 (1. Dezember 2020): 115653. https://doi.org/10.1016/j.envpol.2020.115653.

Murazzi, M. E., P. Cherubini, I. Brunner, R. Kägi, M. Saurer, P. Ballikaya, F. Hagedorn, M. Al Sid Cheikh, G. Onandia, und A. Gessler. „Can Forest Trees Take up and Transport Nanoplastics?" *iForest - Biogeosciences and Forestry* 15, Nr. 2 (2022): 128. https://doi.org/10.3832/ifor4021-015.

Rillig, Matthias C., Anika Lehmann, A. Abel de Souza Machado, und Gaowen Yang. „Microplastic Effects on Plants". *New Phytologist* 223, Nr. 3 (2019): 1066–70. https://doi.org/10.1111/nph.15794.

Zang, Huadong, Jie Zhou, Miles R. Marshall, David R. Chadwick, Yuan Wen, und Davey L. Jones. „Microplastics in the Agroecosystem: Are They an Emerging Threat to the Plant-Soil System?" *Soil Biology and Biochemistry* 148 (1. September 2020): 107926. https://doi.org/10.1016/j.soilbio.2020.107926.

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