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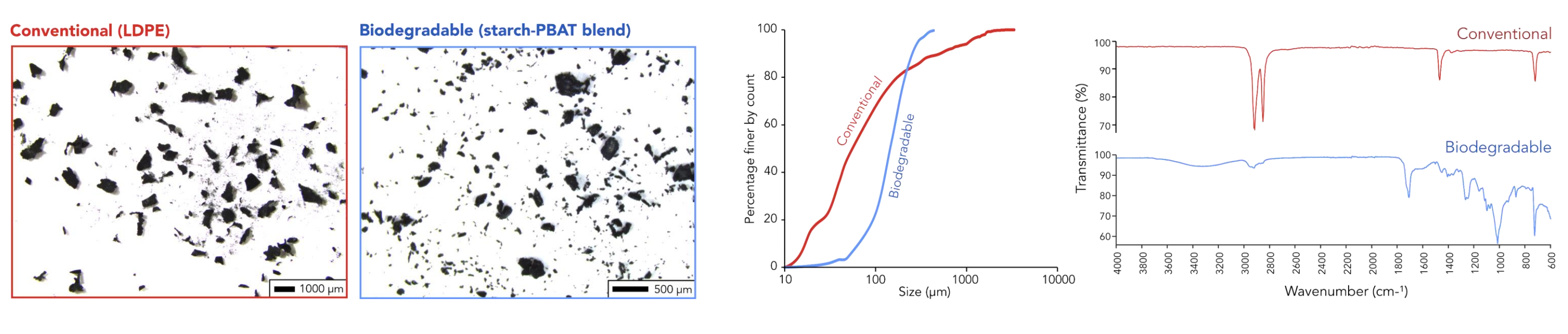
Context

- Mulching films are expected to represent an important source of microplastics to agricultural soils.
- The transport and fate of these particles and associated chemical additives remains a persistent knowledge gap.

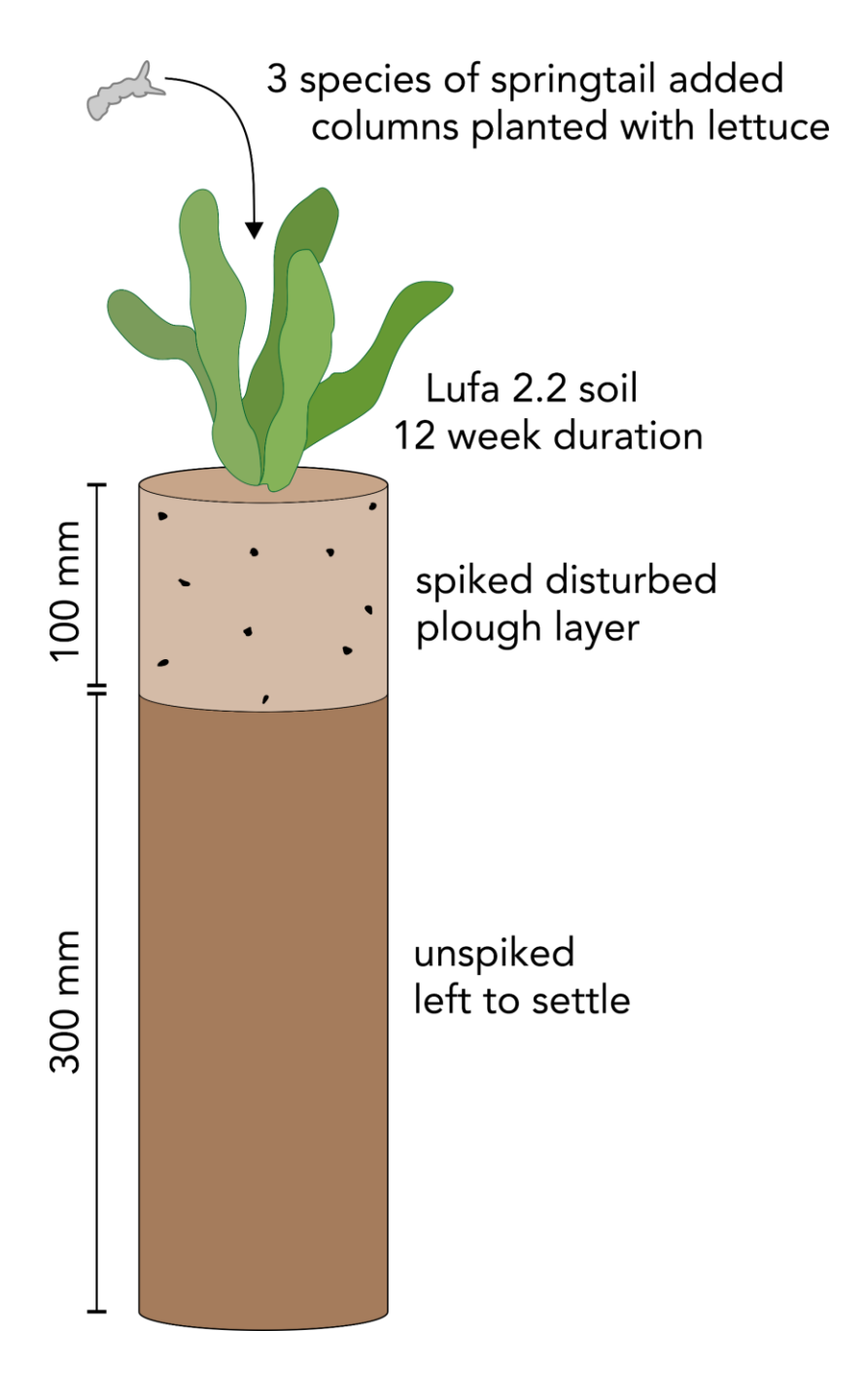
Aim

To track the vertical transport of microplastic derived from two relevant mulching film types (conventional non-biodegradable, and biodegradable) in soils and investigate the role of two drivers of mobilisation: bioturbation and soil water inputs.

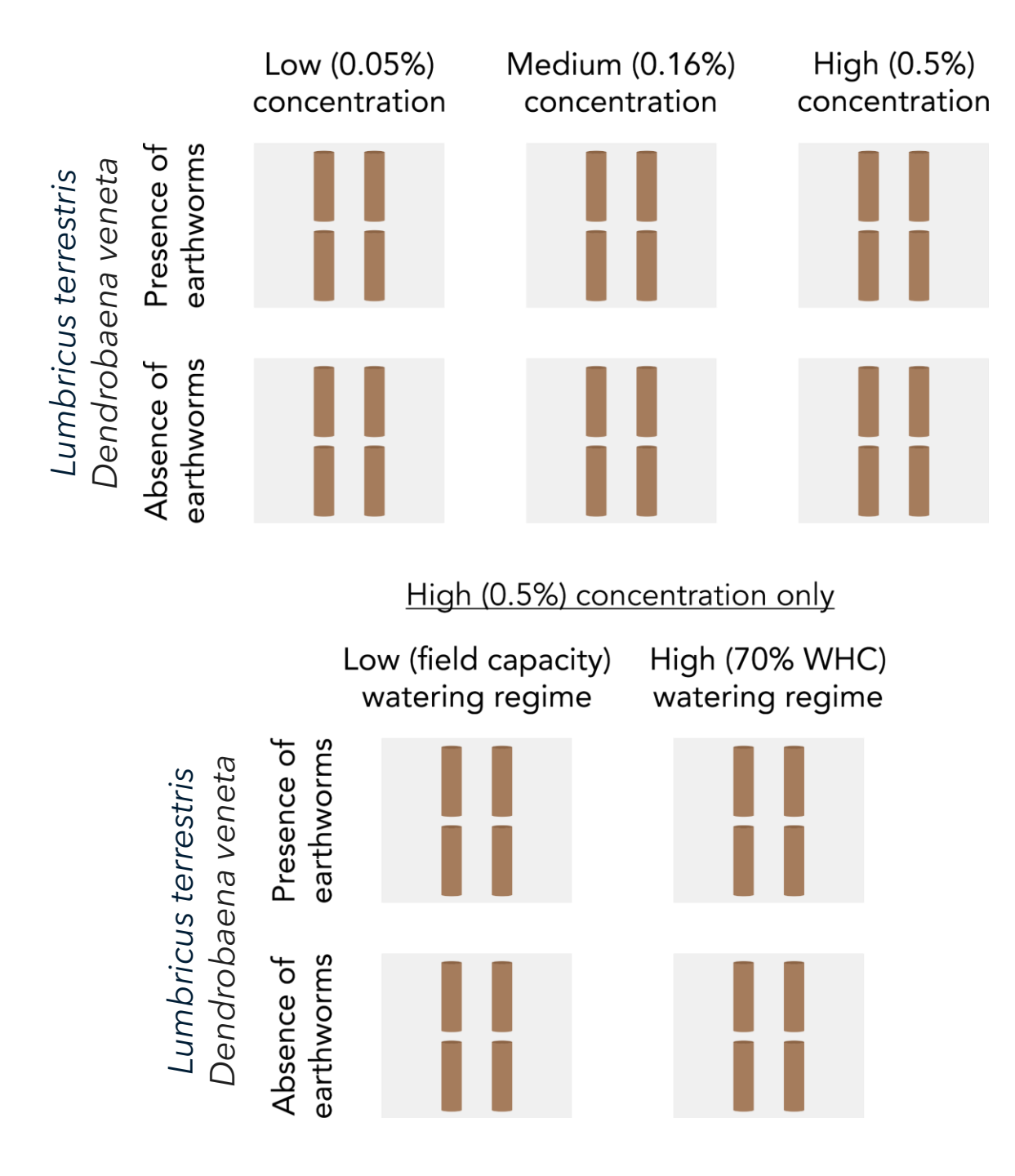
Test materials



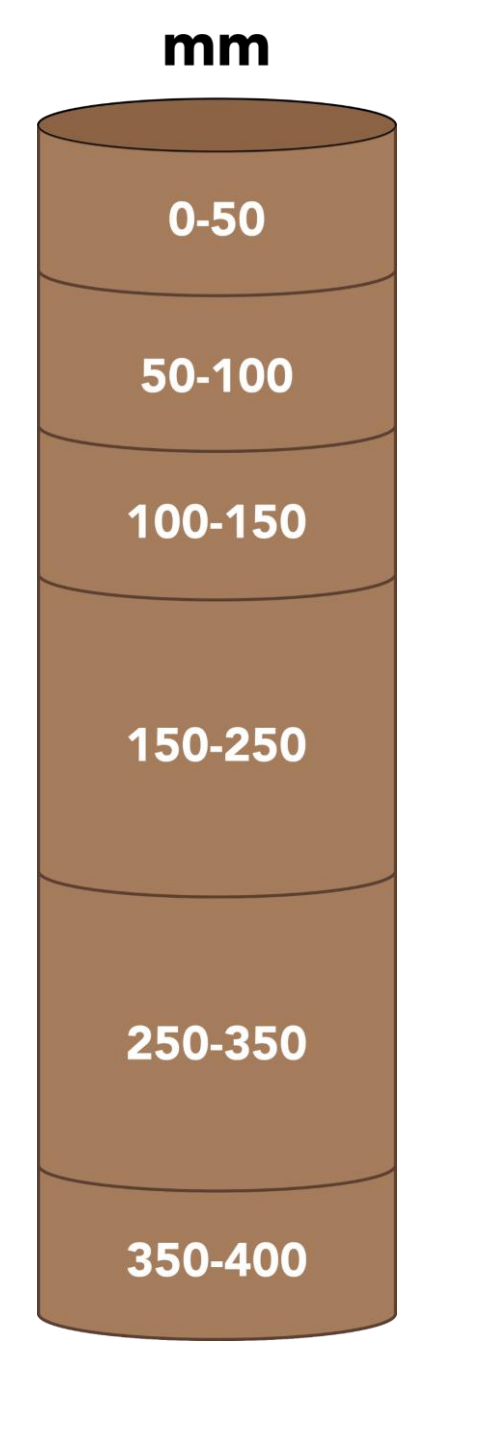
Mesocosm design



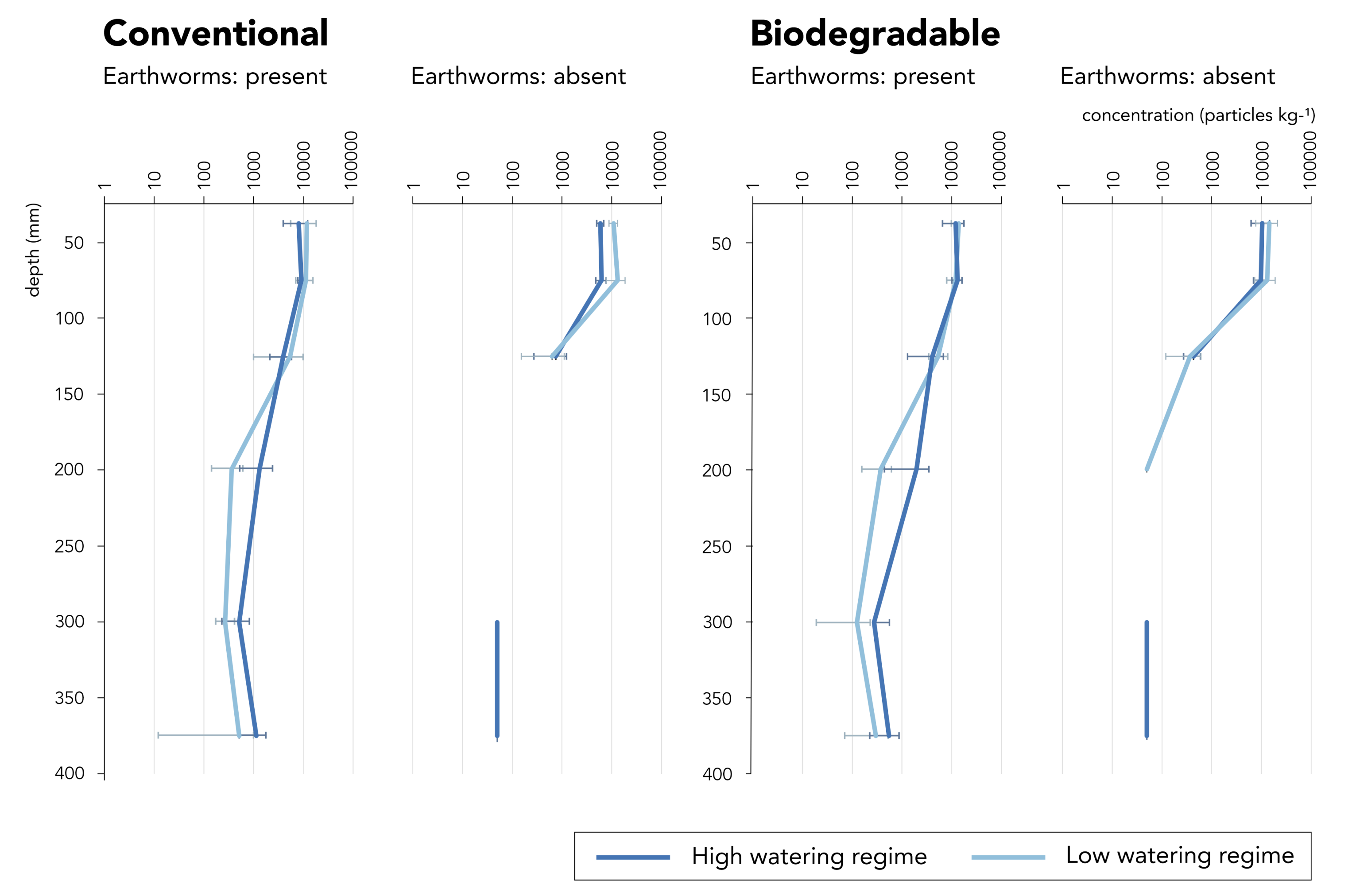
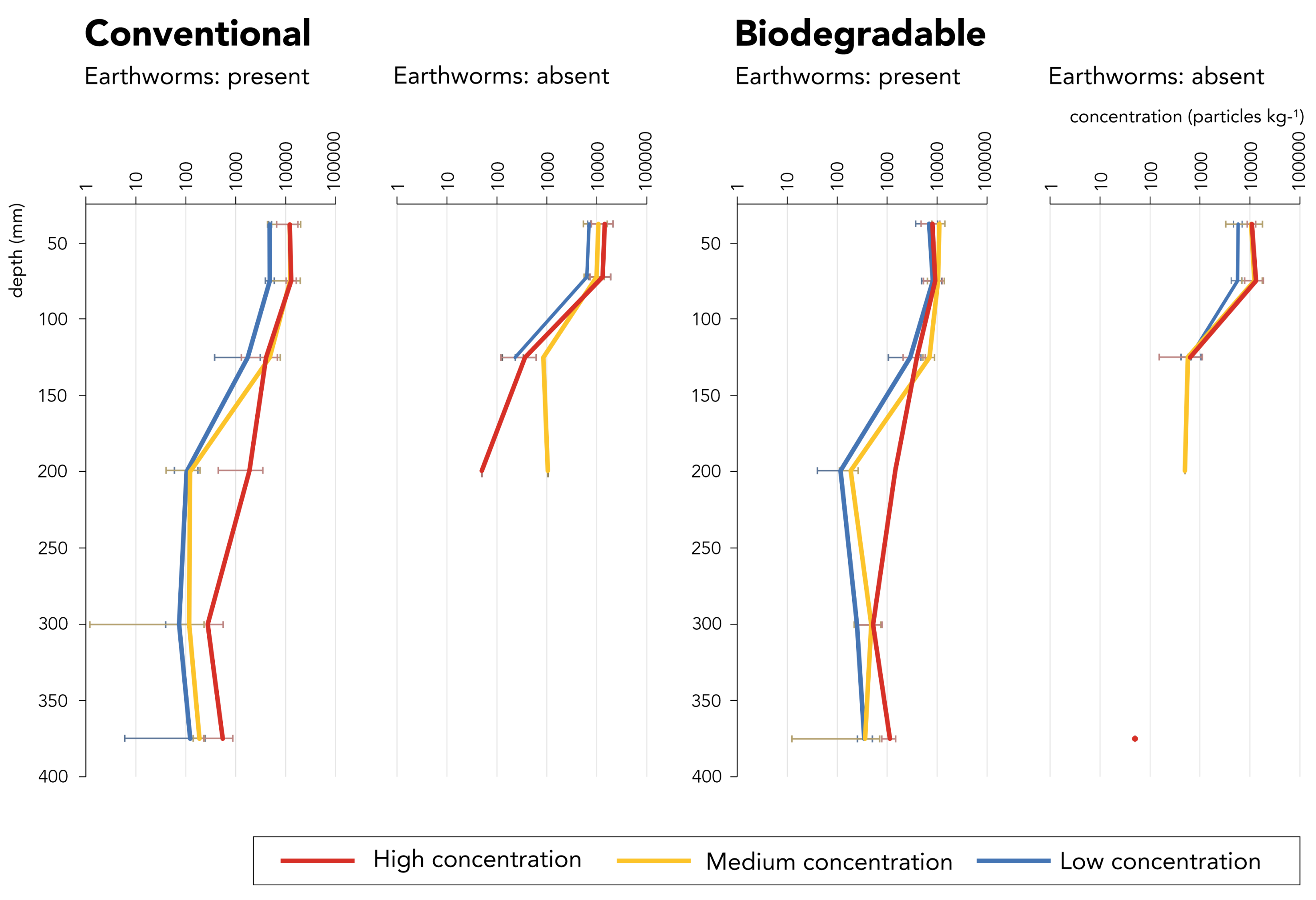
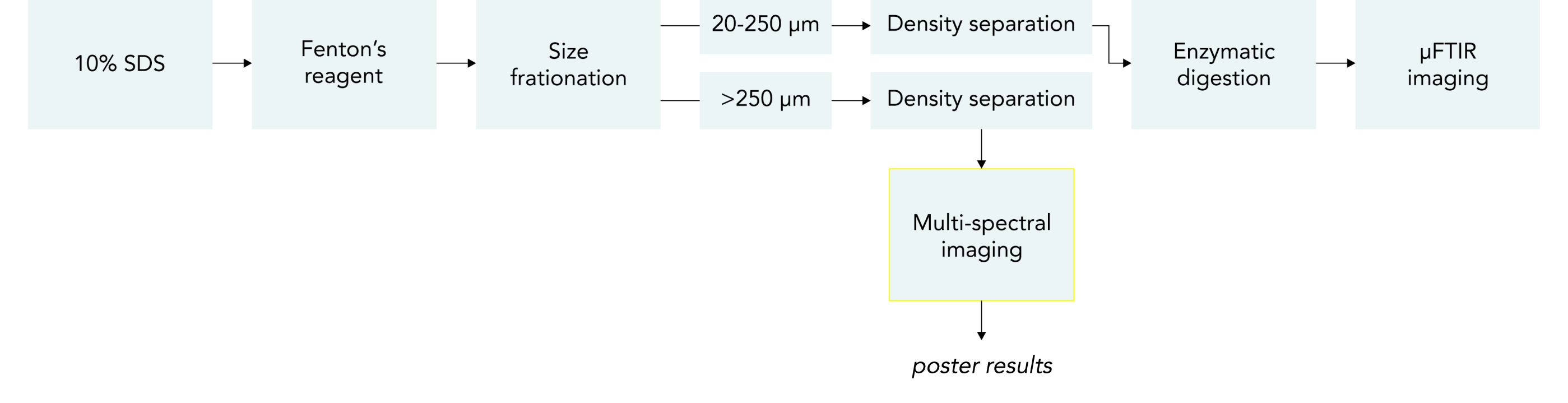
Treatments



Sampling



Sample processing and analysis



Vertical transport of microplastics

- Earthworms represented the major driver of microplastic vertical transport**, with lower influence observed for high versus low watering regime.
- No significant difference in particle size in deeper layers, and both mulching film types presented similar pattern. Therefore, **size and material composition were not critical factors**.
- However, the **majority of particles remained in upper spiked layer** indicating limited mobilisation during the 12 week experiment.

Chemical additives

- Analysis of 20 chemical additives using UPLC-MS/MS.
- Only two antioxidants (Irgafos 168 and Irganox 1010) and a plasticiser (Tributyl-O-acetylcitrate) detected.
- Tributyl-O-acetylcitrate only found in the lowermost layers and also present in controls, indicating another source.
- Irgafos 168 and Irganox 1010 only found in uppermost layers and directly related to presence of mulching film fragments.
- Limited mobilisation of additives observed in this study.**