Vertical transport of microplastic in agricultural soil in controlled irrigation plot experiments

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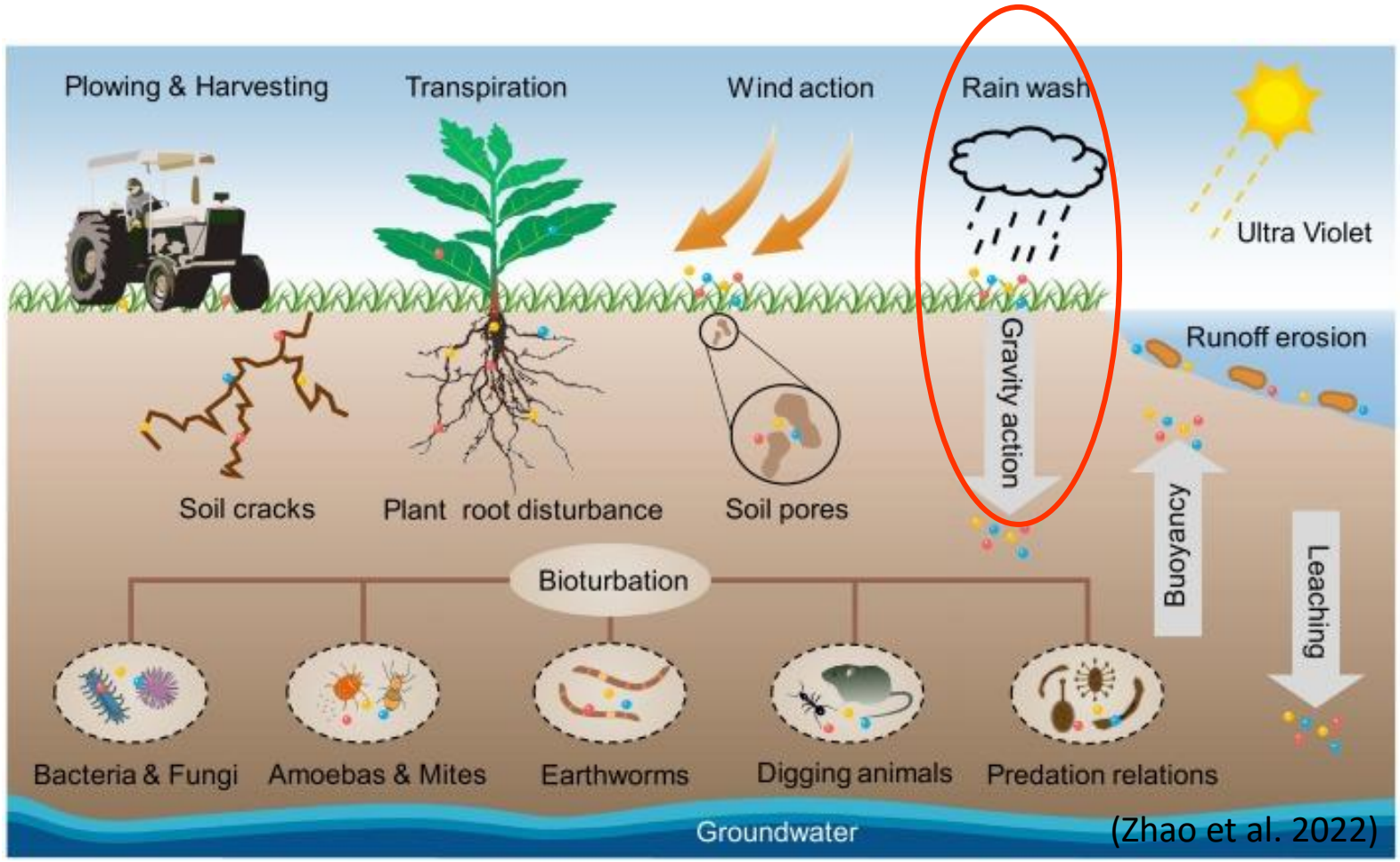
Sharing is encouraged

What do we know ?



Migration of MPs in soil can be influenced by many factors.

- **Soil Property**
- **Plastic Property**
- **Environment condition**

Figure 1: Migration of microplastics in terrestrial systems.

Zhao et al. 2022. Review on migration, transformation and ecological impacts of microplastics in soil. Applied Soil Ecology 176, 104486.

What is unknown ?

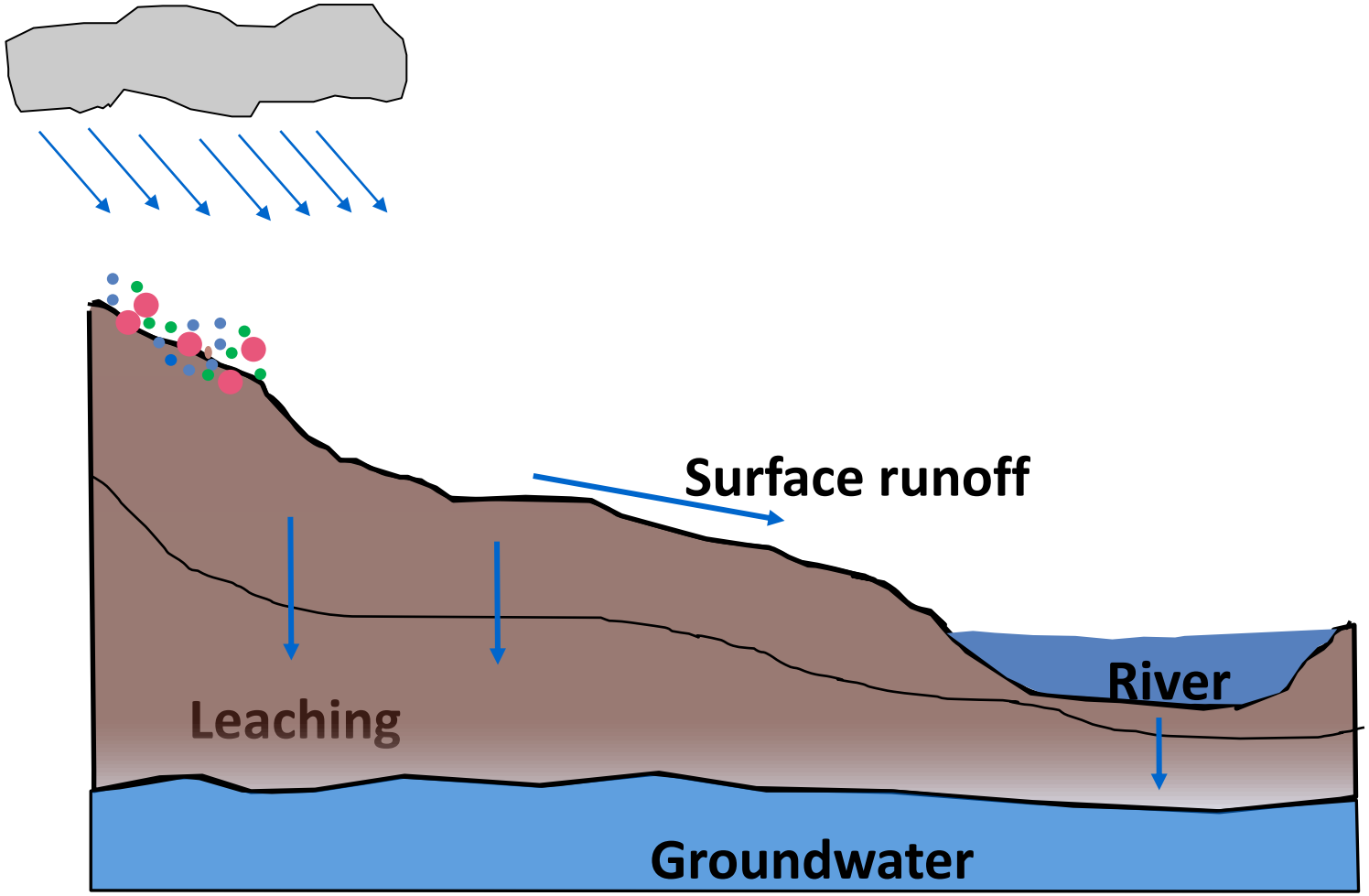


Figure 2: Movement of microplastics under rainfall event.

How MPs behave under rainfall ?

Fate ?

Source: Word Bank

What we want to know ?

Track horizontal movement/ soil and MP erosion by understanding enrichment

Understand vertical movement via depth profile of tracer and MP

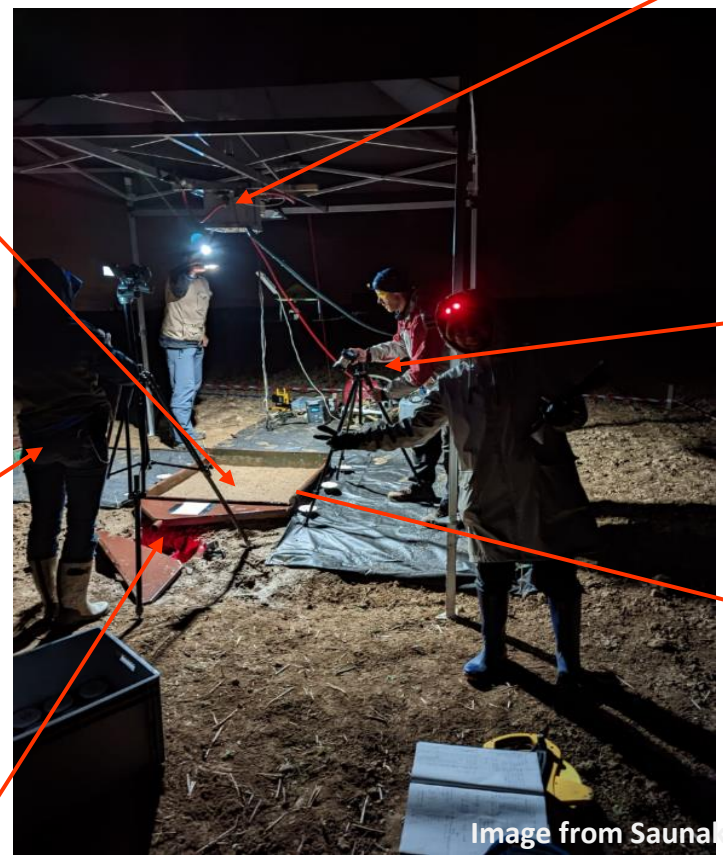
High-resolution tracking of temporal and spatial movement of PE on the soil surface

Investigate the pore size distribution and hydraulic properties of MP-infused soil

Experiment Setup

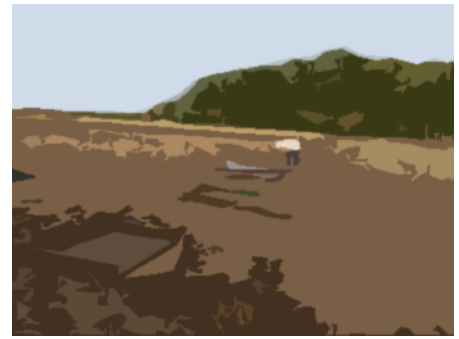
Stable isotope tracer input

Fluoresecent PE microsphere 53-63 µm, 125-150 µm, 425-500 µm



Surface topography

Real-time camera tracking



Runoff collection

Soil sampling

Tracer Results

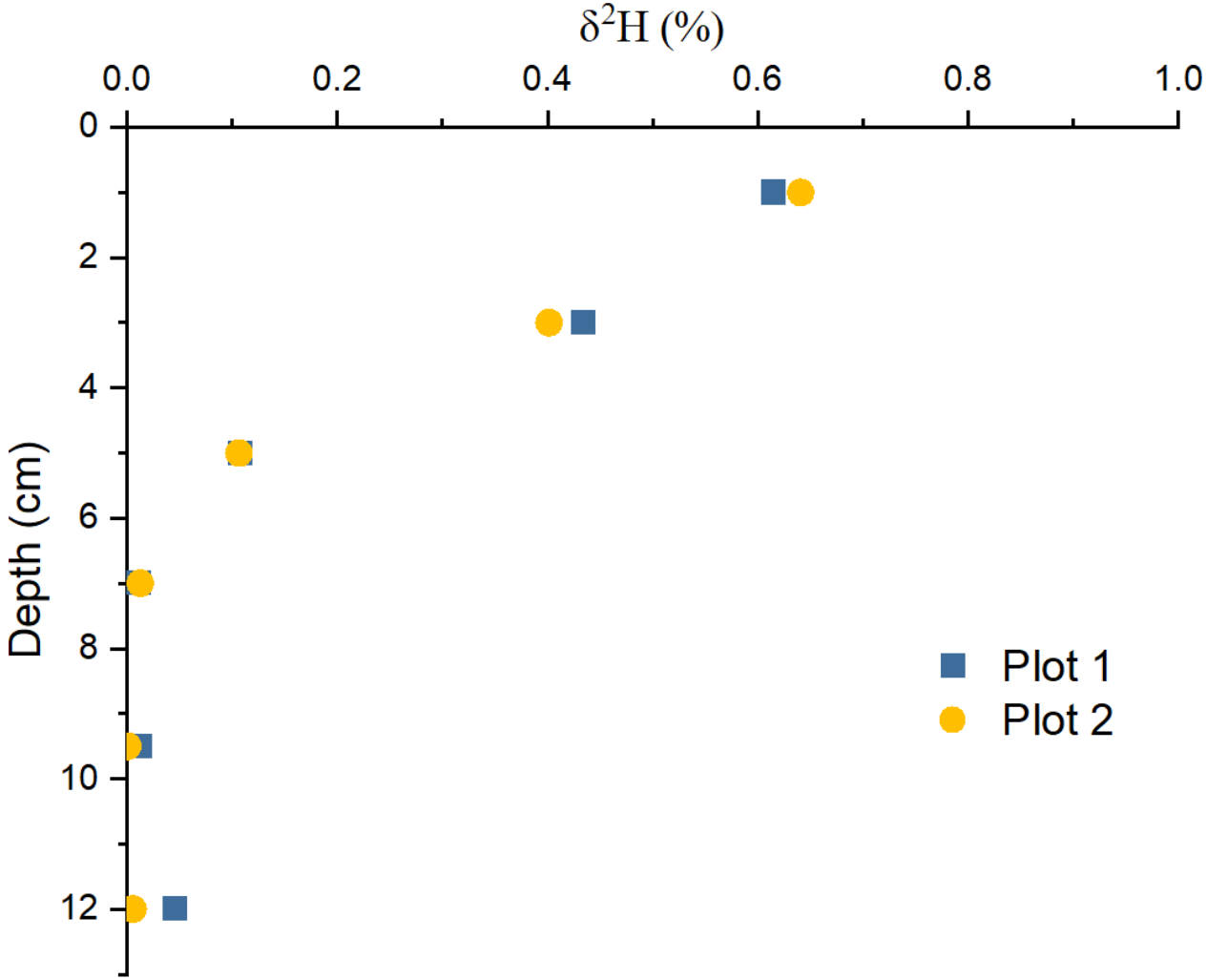


Figure 3: Relative tracer fraction of δ^2H in soil profiles.

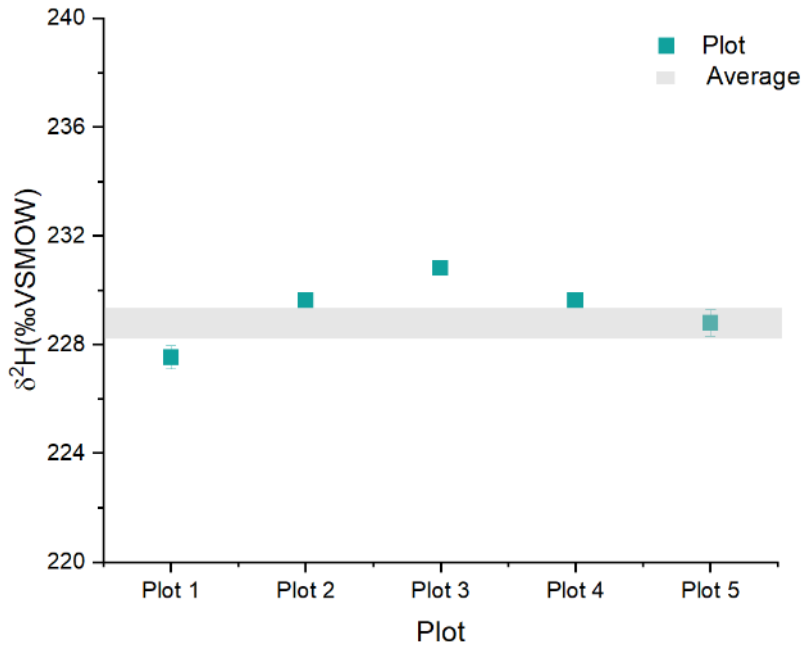


Figure 4: Input tracer concentration in plots.

What did we find ?

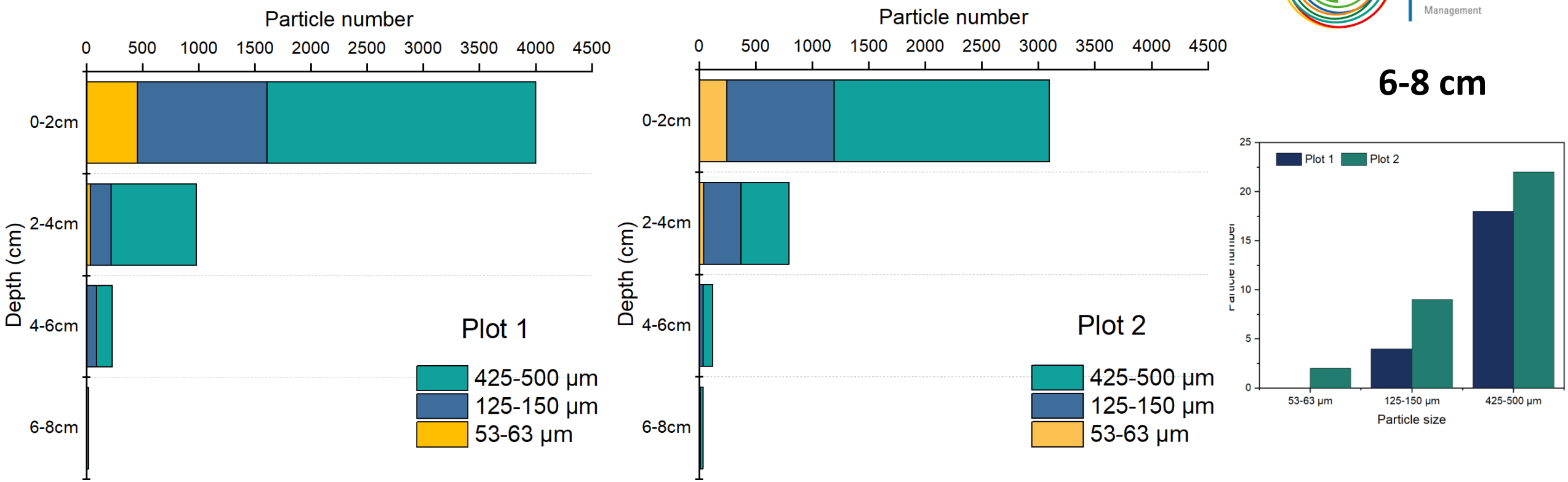


Figure 5: Observed microplastics numbers at different size range in soil profiles.

- **Results from microplastics analysis were corresponded with tracer results**

Summary

- Infiltrated water act as vector for facilitating the downward migration of MPs
- MPs showed high mobility within short simulated rainfall event indicating the possibilty of leaching risk.
- Results combined with surface runoff data and high-resolution image tracking would provide valuable understanding of MP transport behavior in agricultural catchments.

What's next ?

Goal: Long-term observation of MPs movement under natural condition.

More soil sampling + Modeling

Dynamic data

Risk assessment

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Thank you

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