Effects of biodegradable and un-biodegradable plastic mulches on soil abiotic characteristics and microbial populations involved in N cycle

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SOILS: WHERE FOOD BEGINS

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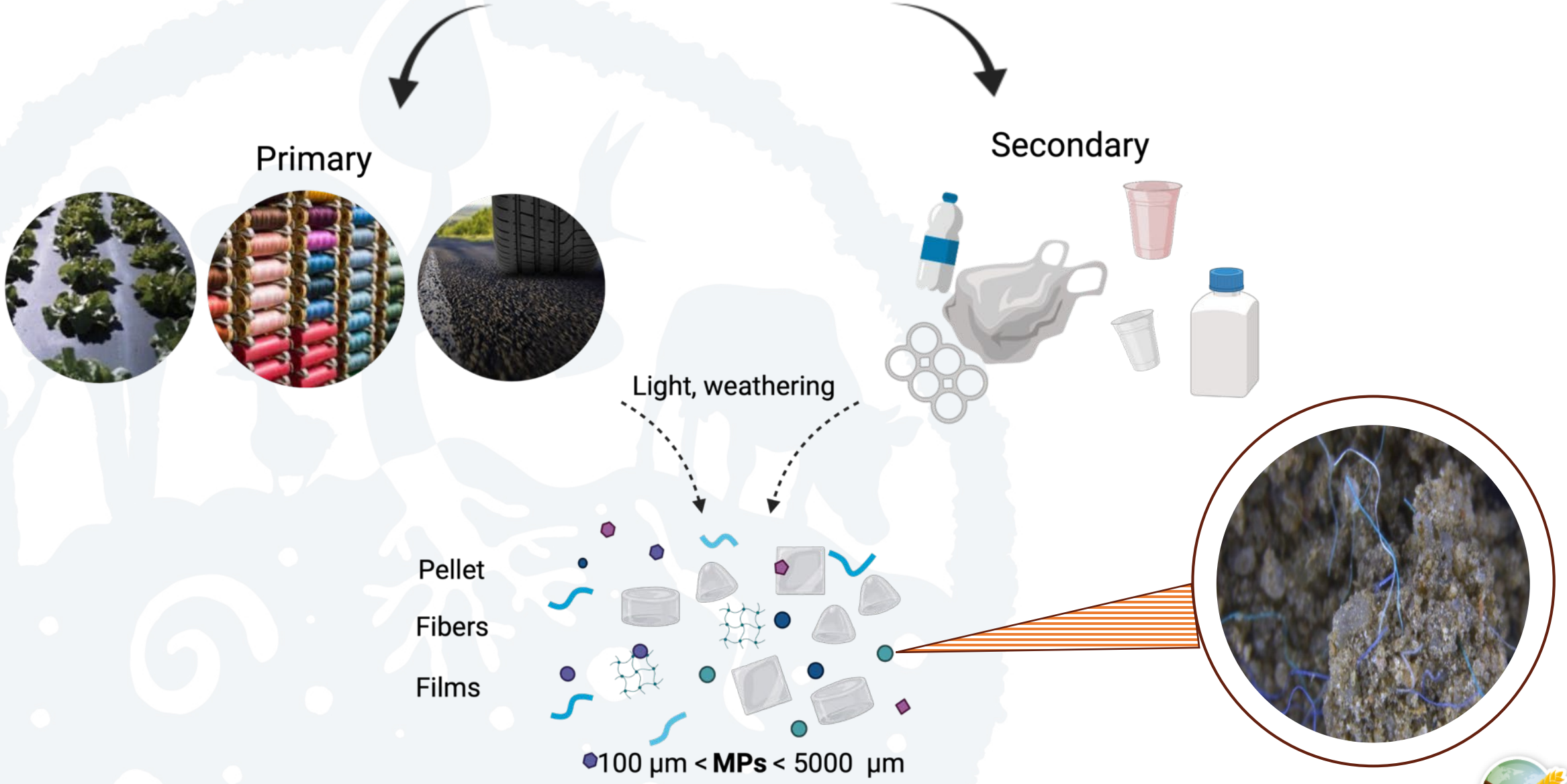
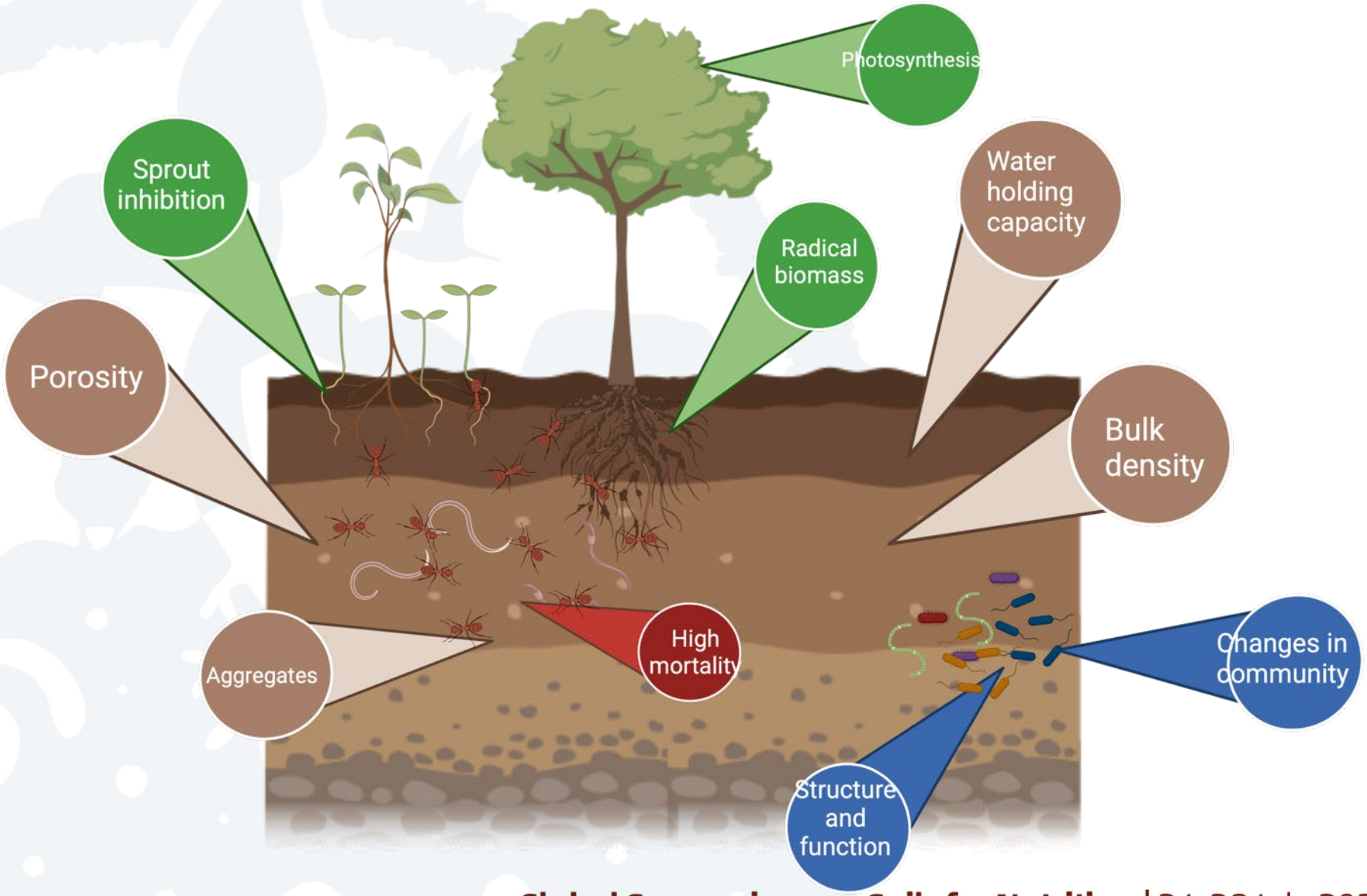
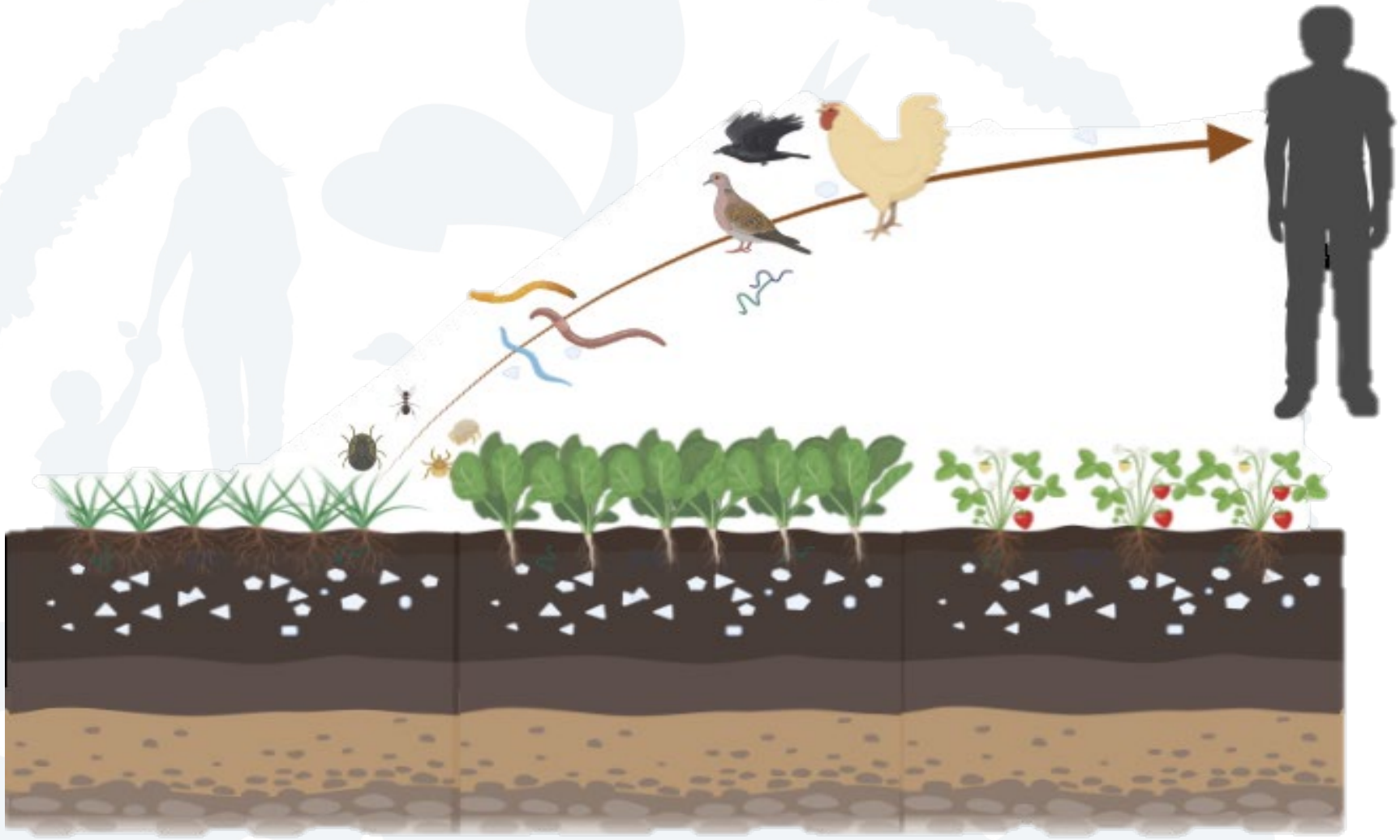
What are the sources of microplastics in the terrestrial environment?



What are the effects of microplastics on soil?



Microplastics in agroecosystem, the fate?



Polyethylene is the most common polymer for mulching

MaterBi® is an environmentally-friendly bioplastic

Agricultural mulch sheets, subjected to ageing, can be abraded and deterioreted

Microplastics 0-20 cm in surface soils

Question

What are the effects of Polyethylene and MaterBi® on soil microbial populations involved in N cycle after six months?

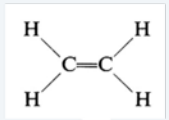
Materials and Methods

Outdoor Mesocosms set up

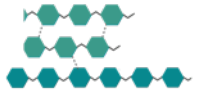
PE

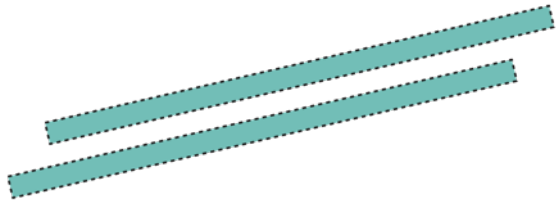
M

Polyethylene (PE)

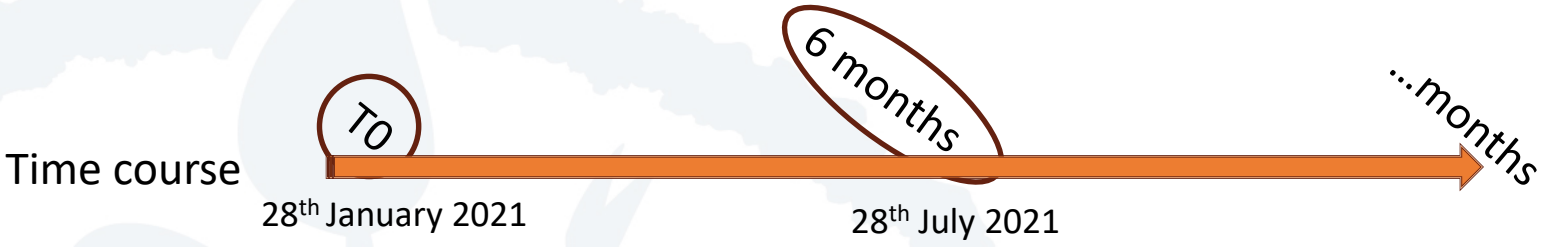


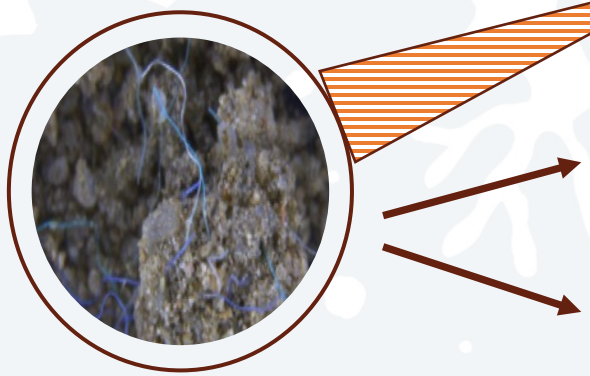
Mater-Bi (M)





Materials and Methods

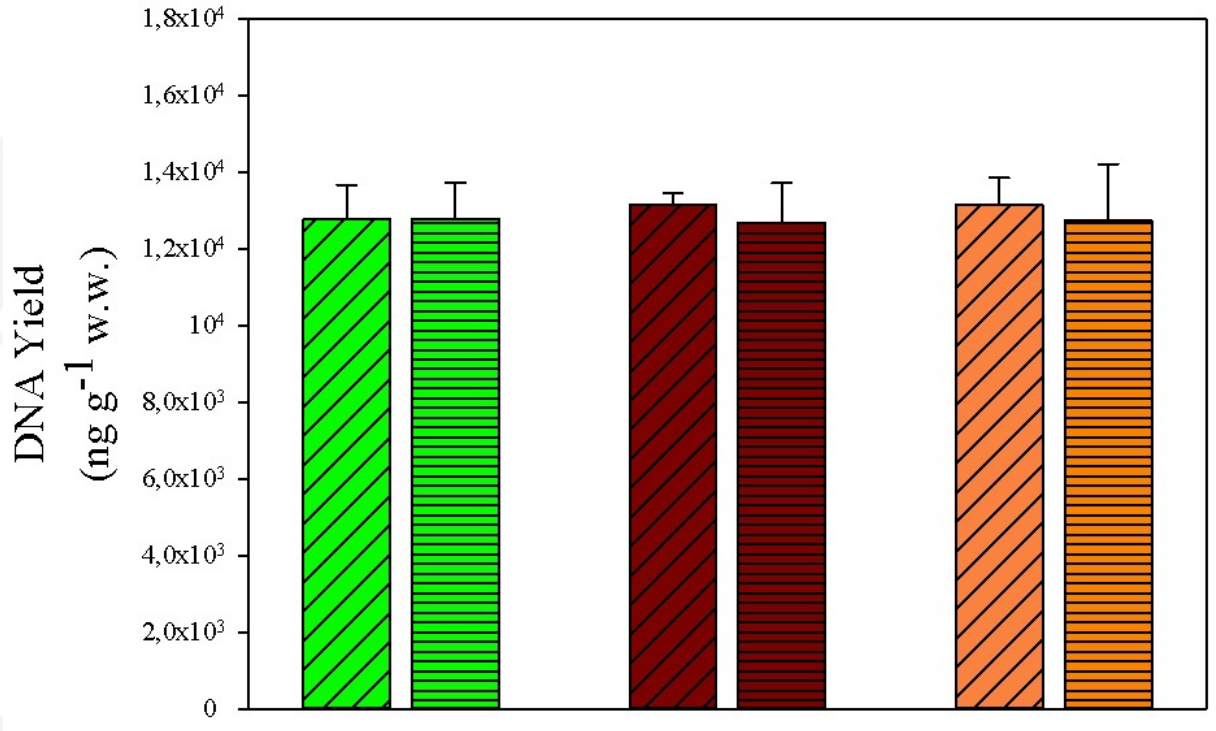


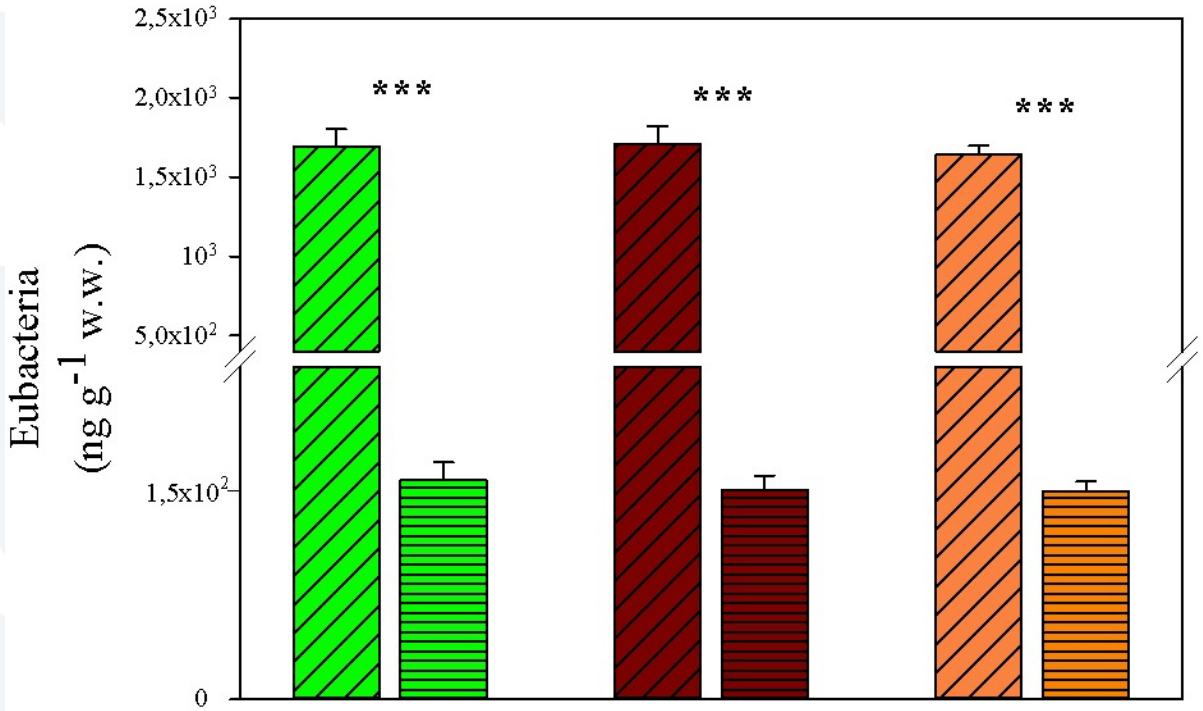


DNA extraction → Quantitative PCR (qPCR) → Microbial Abundances

Nitrogen compounds assays

Results

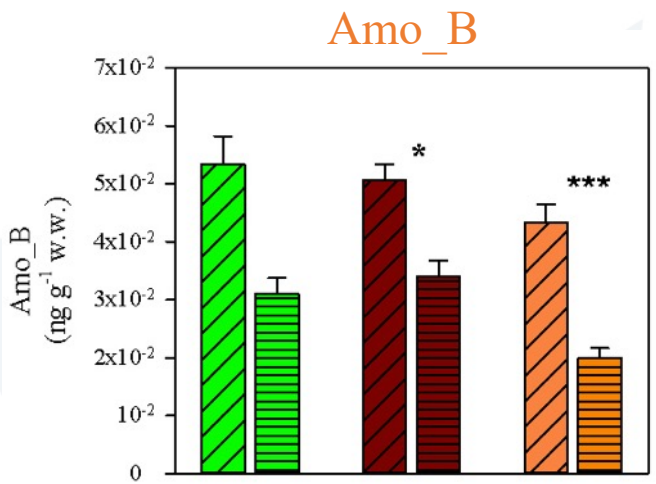


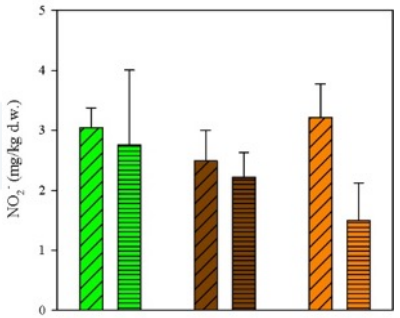


T0 C PE 6m M

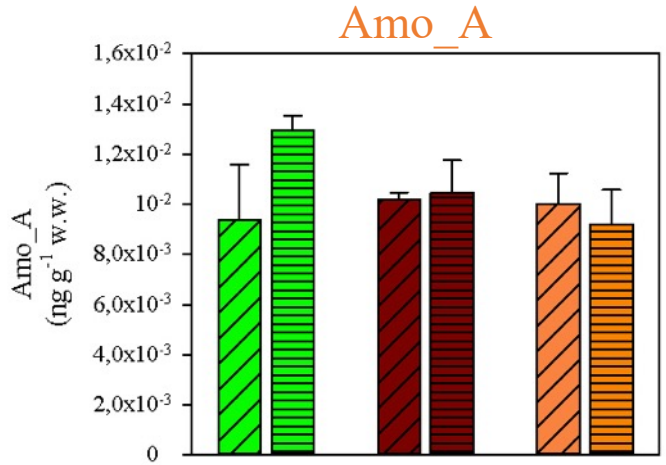
Significant decreases of soil Eubacteria populations over time

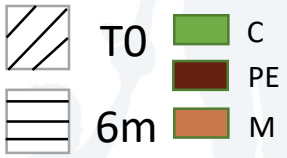
N Cycle

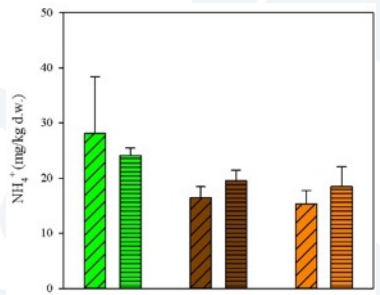




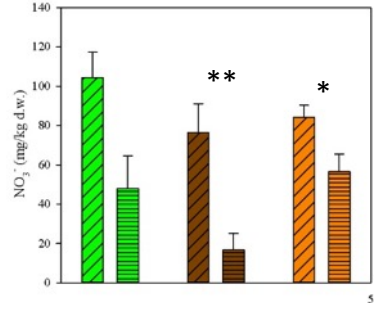
NO^{2-}





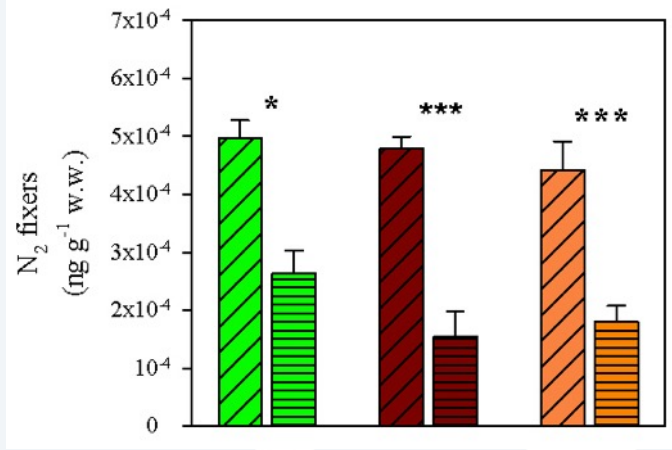


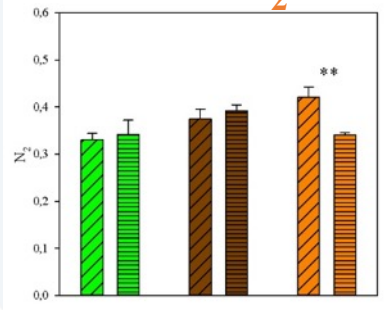
NH_4^+



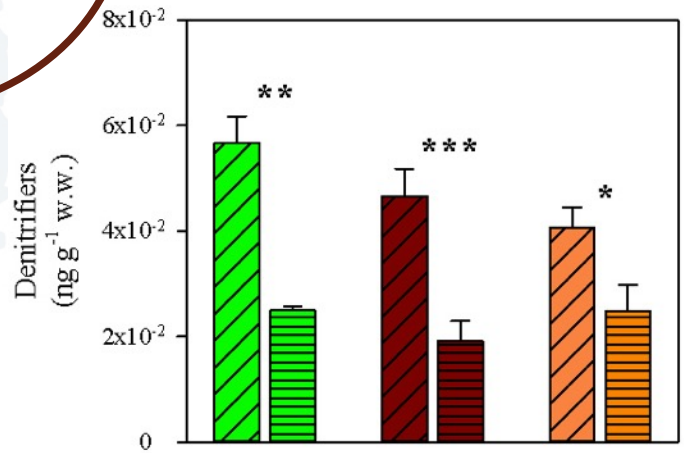
NO^{3-}

N_2 fixers





N_2



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Conclusions

What are the effects of Polyethylene and MaterBi® on soil microbial populations involved in N cycle after six months?

- *At T_0, the microbial abundances did not significantly differ in soils covered by PE and M. After six months, the microbial abundances were significantly lower in soils covered by M than by PE.*

- *All the soil microbial abundances, with the exception of Amo_A, significantly decreased after six months of exposure to both M and PE.*

Acknowledgements

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- Dr. Gabriella Di Natale

Thank you !