

PLASTIC UNDERFOOT: ECOTOXICOLOGICAL CHARACTERISATION OF WEATHERED POLYMER-BASED MATERIALS IN SYNTHETIC TURF SYSTEMS

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Introduction

- Urbanisation leads to the replacement of natural turfs by synthetic ones.
- Synthetic turfs provide advantages but may have unsuspected environmental impacts.
- One of the most underexplored potential impacts is the environmental hazard posed by the materials used in synthetic turf systems.



To study the ecotoxicological effects of turf-derived leachates on soil and aquatic non-target organisms.

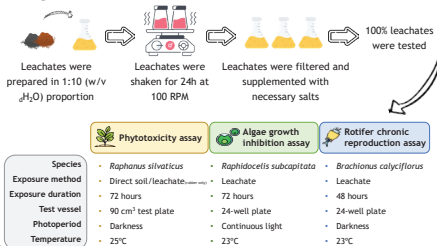
Material and methods

The soil underneath a football pitch was sampled in two different sites (B1 and B2).

Peripheral (PER) soil was collected from adjacent soils and LUFA soil was used as laboratory reference.



Rubber granules were collected from the infill layer of the synthetic turf.



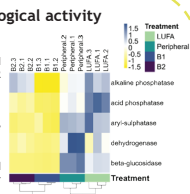
Results

Soil biological activity

Overall, B1 and B2 soils showed lower enzymatic activity than PER and LUFA soils.

B-glucosidase, aryl-sulphatase, and acid phosphatase were clearly reduced.

This results suggest impaired nutrient cycling on soils under artificial turfs.

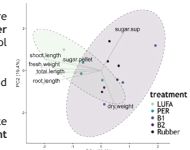


Phytotoxicity assay with *Raphanus silvaticus*

Total length and fresh weight were reduced in B1, B2, and rubber treatments, compared to control (LUFA soil).

Shoot length was reduced in B1 and rubber treatments.

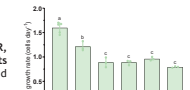
Overall, results demonstrate sublethal effects, impairing plant somatic growth.



Algae growth inhibition and rotifers chronic exposure

Raphidocelis subcapitata

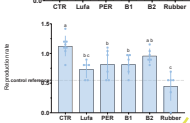
Growth rates were lower in PER, B1, B2, and rubber treatments compared to LUFA leachate and CTR.



Brachionus calyciflorus

Reproduction rates were reduced in soil leachates compared to control.

Rubber leachate induced the strongest reduction compared to all treatments.



Conclusions

- Synthetic turf systems can alter soil biological functioning, reducing key enzymatic activities linked to nutrient cycling.
- Turf-derived leachates induced sublethal ecotoxicological effects across trophic levels, including algae, rotifers, and plants.
- Overall, artificial turf materials represent a potential source of environmental contamination requiring further long-term assessment.