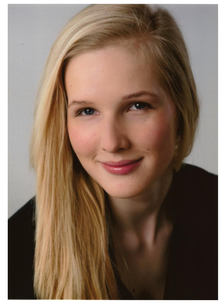
Universität Rostock

Traditio et Innovatio



Influence of microplastics on grassland stocks

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1. Introduction

- Production and consumption of all-kind plastic are globally rising
- Mismanagement of plastic debris and littering behaviour lead to microplastic accumulation
- Microplastic is increasingly entering and persisting in all environmental compartments
- Indistinct consequences for terrestrial ecosystems
- Knowledge on the interaction of food-web plants like crops or fodder plants and microplastic is so far fragmentary

2. Materials & Methods

- Germination trials in petri dishes (laboratory conditions)
- Model plant: *L. multiflorum* var. *Westerwoldicum*
- Microplastic (MP):
  1. tyre wear derivatives:
     - W0004 (< 80 – 400 µm); W0610 (600 – 1000 µm); W2550 (< 2000 – 5000 µm)
  2. polyvinylchloride (PVC): 1 – 63 µm
  3. MP-extracts in aqua dest.
- Concentration levels: 0 g (control); 0.5 g; 1 g; 1.5 g; 2 g

Parameter Analysis:

- Germination rate according to ISTA (International Seed Testing Association): normal, abnormal, ungerminated
- Dry matter yield
- Analysis of root parameters
- Isotopic measurements

3. Results

- Germination decreased under influence of MP (Fig. 1)
- Large number of abnormal and ungerminated seeds with larger applications of MP (Fig. 1)
- Almost no germination of seeds in PVC treatments (Fig. 1)
- Total root length decreased in plants with MP-treatment, most severe for PVC (Fig. 2)
- Root lengths least impacted by smallest concentrations and MP extracts (Fig. 2)

4. Conclusion

- MP impaired germination in most treatments
- The decrease in plant performance depends strongly on the type of MP
- Decrease of root lengths of ryegrass may be compensatory behaviour due to an MP-induced dysfunction of the overall plant water balance

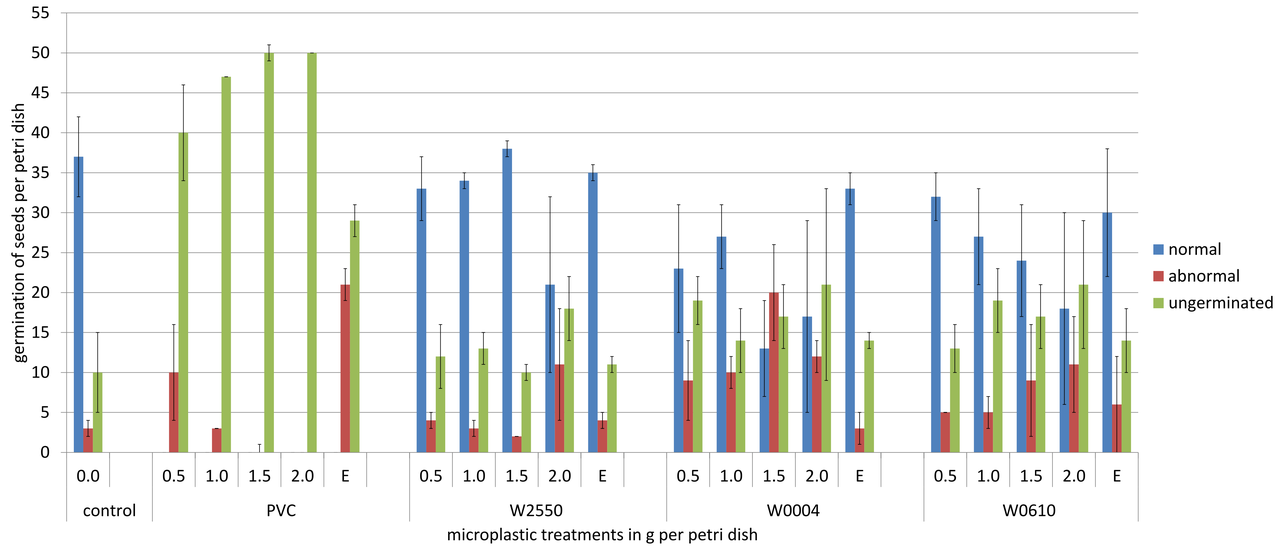

Figure 1: Germination rate of ryegrass seedlings (50 seeds = maximum), counted according to ISTA (International Seed Testing Association), differentiated into normal, abnormal and ungerminated for microplastic treatments (PVC, tyre wear derivatives (W0004; W0610; W2550), MP-extracts: E) and concentration levels (in g). Mean ± standard error are presented.

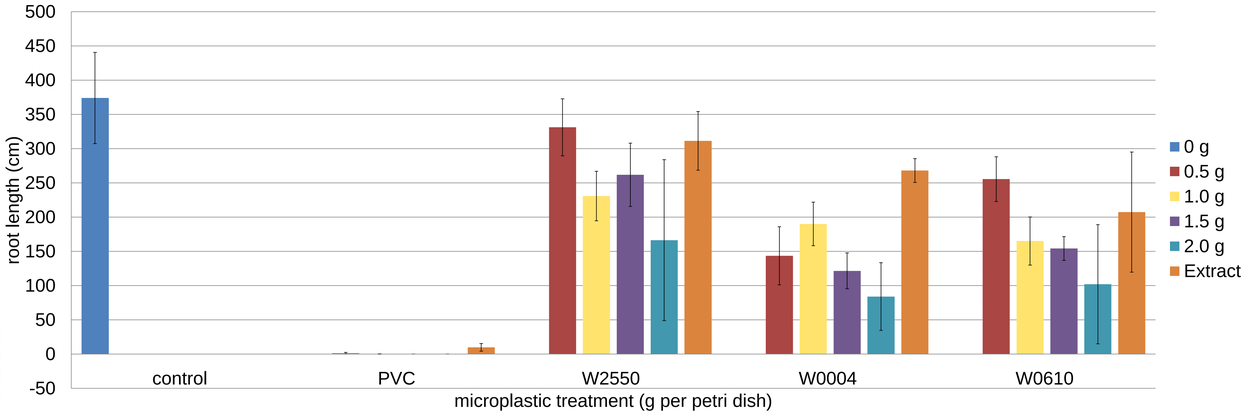

Figure 2: Total root length of ryegass seedlings in cm, shown for the different microplastic treatments (PVC, tyre wear derivatives (W0004; W0610; W2550), MP-Extracts) and concentration levels (in g). Mean ± standard error are presented.

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