

Effects of microplastic pollution on Mediterranean coastal plants

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Background

Plastic pollution has become a global problem in the last decades with linkage to human activity. Due to changing biological, chemical and physical conditions in the environment, this plastic degrades into nano and microplastics (MPs) that might harm organisms, including plants. Most research on plastic pollution in plants focused on aquatic or agriculture plants. However, research on the impact of plastic on wild terrestrial species could have important implications on our understanding of its effects on natural ecosystem. This research focuses on evaluating the effects of microplastics—weathered vs. pristine as well as biodegradable vs. non-biodegradable—on native coastal plants.

Synthesis of environmentally-relevant plastic

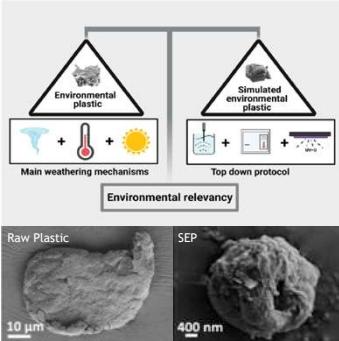


Fig. 1: Top down protocol that simulates environmental conditions, resulting in particles with similar physical and chemical traits (Simulates Environmental Plastic (SEP)).

*Engineered Polystyrene-Based Microplastics of High Environmental Relevance
Amit Kumar Sarkar, Andrey Ethan Rubin, and Ines Zucker*

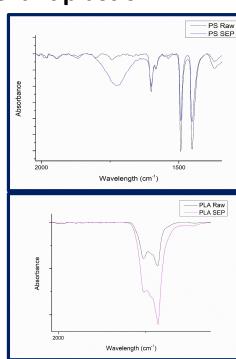


Fig. 2: FTIR of PS raw and Sep after UV/O treatment for oxidation.



Cutandia Maritima



Pancratium Maritimum

Testing the effect of MP on coastal plants

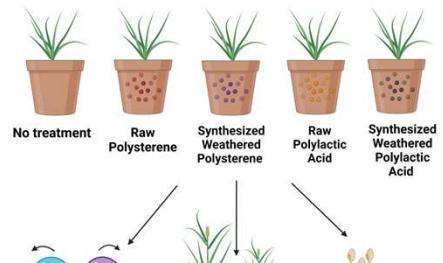
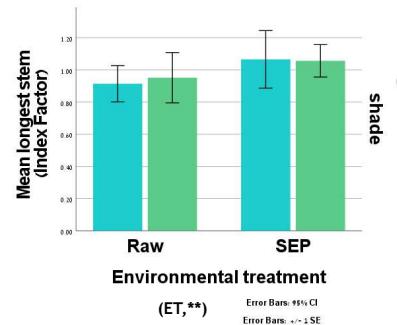


Fig. 3: Plants' contamination process and testing on 17 individuals per treatment with concentration of 10^6 particles/L.

Results

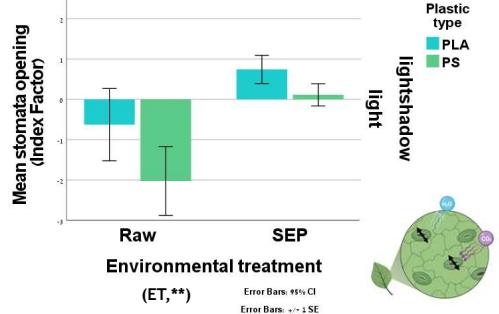
SEP stimulates stem elongation in the shade



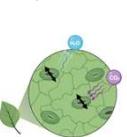
light
shadow



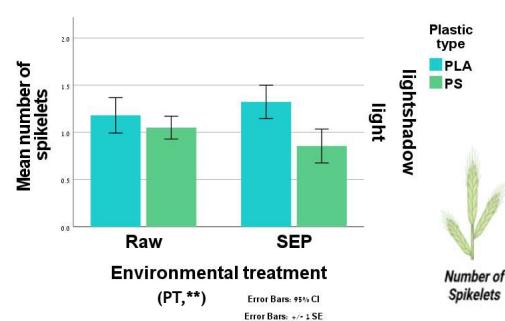
Raw plastic induces stomatal closure in the light



light
shadow



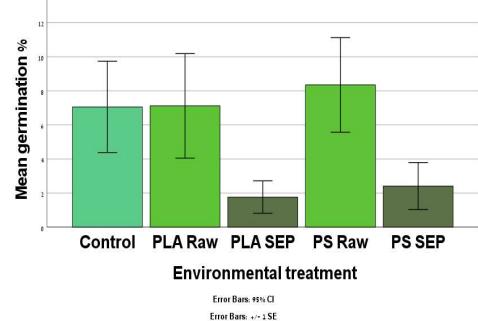
PS decreases spikelet production in the light



light
shadow



SEP decreases seed viability



Conclusions

- Both plastic type and its environmental weathering can affect plant growth and reproduction.
- The strongest effect observed is that of weathered plastic on the viability of the next generation, suggesting important negative implications on populations of endangered species such as *Cutandia Maritima*.