Environmentally relevant concentrations and sizes of microplastic do not alter marine diatom growth

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Microplastic (MP), i.e. plastic debris smaller than 5 mm, are widely distributed in the global ocean. Considering such a wide distribution of MP in the marine environment and their high availability to marine biota, concerns have raised about their toxic effects on marine life. For example, the growth of marine diatoms, a primary producer organism at the basis of the marine food web, may be impaired by MP contamination. The current knowledge about the ecological effects of MP remains limited, and to-date ecotoxicity tests often utilize standard MP with one or two distinct size classes and expose the organisms to unrealistically high MP concentrations.

We exposed the marine diatom *Phaeodactylum tricornutum* to microplastic particles by mimicking a realistic size-frequency distribution complemented with serial experiments with distinct size classes. To do so, we exposed this diatom to a concentration series of differently sized polyethylene (PE) microbeads (sizes: 10 – 106 µm; 1.25 x 10^2 - 1.25 x 10^7 particles / L) in a 72-hour growth inhibition test. No significant effect was observed on the growth of *P. tricornutum* by virgin PE microbeads up to 1.25 x 10^7 particles / L (or 499 mg / L).

Our results indicate that environmentally relevant concentrations and sizes of MP do not alter the growth of marine diatoms. Results of smaller sized MPs (10 - 20 µm) did not differ from those obtained with larger MPs (90. – 106 µm) and mix sized MPs (10-106 µm), i.e. had no impact on the microalgae growth. As a pioneer work, our results contribute with high-quality dose-response data to an improved risk assessment of microplastic under realistic present and future marine MP pollution.

Keywords: Microplastic; Marine diatom; Growth inhibition; Environmentally relevant