IMPACT OF LEACHATE FROM CAR TIRE MICROPLASTICS ON THE MARINE HETEROTROPHIC DINOFLAGELLATE, OXYRRHIS MARINA.

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Abstract: Tire wear particles (TWP) are the major contributor to microplastic pollution in the marine environment. There is increasing evidence that leached plastic additives are the main responsible for microplastic toxicity to plankton. In this study, we tested the effect of leachates from micronized car tire particles on the growth of the marine heterotrophic dinoflagellate *Oxyrrhis marina*. Heterotrophic dinoflagellates play key roles in marine food webs as major grazers of phytoplankton and as a link for trophic upgrading of food quality. However, little is known about the impact of TWP leachates on this planktonic group. Our experimental design was constituted of closed glass bottles of 33 mL containing 500 cells mL^{-1} with triplicate of six leachate doses from 0% to 100%. Leachate extract from 1 g of TWP L^{-1} was prepared following four steps: micronization, size fractionation, particle size characterization, lixiviation, and leachate filtration. After a period of incubation of 72 hours, cell concentration and cell size were evaluated. Our results have shown that *O. marina* was sensitive to leachates creating a dose-dependent (EC50=32.3±5.7%) increase in population mortality observed from the lowest tested dose (i.e. 6.25%). Leachate toxicity could be due to the cocktail effect of chemical compounds detected in the TWP leachates, which included metals (e.g. zinc and strontium), flame retardant (e.g. tris (2-chloroisopropyl)phosphate)) and polycyclic aromatic hydrocarbon (e.g. naphthalene). In conclusion, our results demonstrate leachate solution of micronized car tire particles is highly toxic for the marine heterotrophic protist *O. marina.* . This implies that further research has to be conducted to characterize the main plastic additives responsible for this observed toxicity. In the end, these results could be used to improve ocean protection practices and regulations regarding the use of environmentally safer plastic additives.

Key words: Microplastics, leachate, tire wear particles, Heterotrophic dinoflagellate, plastic additives