

EFFECT OF TIRE WEAR LEACHATES ON PHYTOPLANKTON COMMUNITIES OF THE CANARY ISLANDS

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Abstract: Half a million tonnes of microplastics derived from car tires is estimated to reach marine environments every year. Microparticles generated by abrasion of tires, tire wear particles (TWP), are major contributors to microplastic pollution in the marine ecosystems. The composition of TWP consists of a mixture of the main polymer (rubber) and a variety of chemical additives both organic and inorganic. Some of these additives can easily leach from the main polymer into marine environments. Currently, there are few studies about the effects of tire particle leachates on marine phytoplankton; while toxic effects have been observed in monocultures, the consequences of TWP pollution on marine planktonic communities remain unknown. The aim of this study is to evaluate the acute effects of car tire leachates on the coastal phytoplankton communities of Gran Canaria. For this purpose, leachates of micronized car tires (<250 µm) at a concentration of 1 g/L were prepared by incubation on rollers in darkness for 72h. The car tires as well as their leachates were analyzed for selected additives. Samples of natural microplankton communities were exposed to 6 different leachate dilutions (100%, 75%, 50%, 25%, 12.5%, 6.25%) on rollers with 15 rpm for 72h. The chemical composition of the TWP leachates includes polycyclic aromatic hydrocarbons (e.g. naphthalene), flame-retardants, and heavy metals, especially zinc and strontium, suggesting a potential cocktail toxic effect on the phytoplankton community. We assess how exposure to TWP leachates can affect the structure of the microplankton community level, including changes on the abundance and composition of planktonic organisms, and evaluate the potential impacts of TWP on coastal areas exposed urban and road runoff.

Key words: Car tire leachates, microplastic additives, phytoplankton community.

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