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Clean and polluted pollen analysis by scanning electron microscope

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Bioaerosol pollution, such as pollen, can have negative effects on human health, serving as a cause of respiratory allergies. Moreover, pollen may contribute to the dispersion of industrial pollutants due to the accumulation of chemical elements on its surface. Particles that settle on the surface of pollen and modify the pollen microenvironment composition and contribute to external and internal changes, including modifications in the amount and composition of allergens (Ribeiro et al. 2015). This study aims to evaluate the capacity of pollen to adhere to and transport particulate matter, including potential microplastics.
Pollen samples were obtained from plants, collected from various surfaces and from airflow, representing different environmental contexts. Moreover, in the laboratory, pollution of pollen samples was performed. All the collected samples were analyzed using a scanning electron microscope to examine the composition of the pollen, detect different chemical elements, and identify the presence of particles on the pollen surface.
Two types of pollen samples were differentiated: clean and polluted. The analysis of clean pollen samples revealed the presence of chemical elements, including oxygen (O), carbon (C), potassium (K), phosphorus (P), and calcium (Ca), on the surfaces of hazel, alder, willow, pine and birch pollen. The presence of C and O is explained by the pollen wall composition itself, as these are the main elements of the pollen wall material – a biopolymer called sporopollenin. It should be noted that the concentration of these elements may vary depending on factors such as plant species and growth conditions. Moreover, hazel pollen showed the presence of lead (Pb), zinc (Zn), and tin (Sn). These chemical elements can be attributed to environmental pollution. On polluted willow and birch pollen surface silicon (Si), sulfur (S), copper (Cu), iridium (Ir) were identified.
Keywords: pollen, pollen surface, air pollution, pollen pollution
References:
Ribeiro, H., Guimaraes, F., Duque, L., Noronha, F., Abreu, I. 2015. Characterisation of particulate matter on airborne pollen grains. Environmental Pollution

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