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Efficiency of dust control products in suppression of wind-induced dust emission from soils

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Surfaces of disturbed soils are subjected to dust PM₁₀ (particulate matter < 10 μm) emission by wind process regardless of human activities such as vehicles (wheels) traveling. However, there is little quantitative information on the efficiency of dust control products in suppression of wind-induced dust emission. The study aimed to fill this clear gap using wind-tunnel experiments under laboratory and field conditions. Diverse dust control products of synthetic and organic polymers (Lignin, Resin, Bitumen, PVA, Brine) were tested. In the first stage, the products were tested under controlled-laboratory conditions. In the second stage, the products were tested in unpaved roads of an active quarry after the transportation of quarry-haul trucks in two time points after the product application. The results show that in most of the plots the dust emission increases with the wind velocity. PM₁₀ fluxes from the road surface in each plot were calculated to determine the effectiveness of the dust control products. Some products significantly reduced the dust emission, especially the magnesium chloride brine. Additional experiments revealed that the brine can be applied with reduced amount than that of the recommended amount while keeping on low dust emission.