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Metallic Nanoparticles: Differential impact on Fungal vs Bacterial Soil Communities

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This study investigated the impact of metallic nanoparticles (NPs) containing copper, silver, copper oxide, and zinc oxide, recognized as potential pollutants, on the structural and compositional aspects of soil microbial communities in comparison to their bulk counterparts. The influence of these nanoparticles was examined at two distinct accumulation levels within the soil ecosystem.

The potential effects of metallic nanoparticles in comparison to their bulk counterparts were evaluated in a pot experiment under controlled environmental conditions. High-throughput sequencing of PCR-amplified 16S rRNA and ITS2 marker genes was employed to analyze the impact of NPs and counterparts on bacterial and fungal rhizospheric communities using two dosage levels.

Bioinformatic analysis of the obtained sequencing results revealed a distinct metal-dependent differentiation in bacterial and fungal soil community structures. Silver-containing treatments exhibited an enhanced ability to induce changes in both bacterial and fungal communities compared to other metals. Furthermore, treatment dose had a profound differentiation effect on the two microbial communities. The low dose notably influenced bacterial communities to a greater extent compared to the high dose, whereas fungal communities exhibited significant alterations under high-dose conditions rather than under low-dose conditions.

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