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## Community and Species-Specific Responses of Soil-Borne Fungi to Copper Oxide and Zinc Oxide Nanoparticles

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**Purpose:** This research was conducted to evaluate the effects of copper oxide and zinc oxide nanoparticles (NPs) and bulk forms on soil fungal community and to fungal plant pathogens.

**Methods:** Lipa clay loam soil was treated with 300 ppm CuO or ZnO NPs or bulk forms and incubated in sterile pots for 15 days. Colony-forming units was checked on days 1, 8 and 15. Functional richness, growth, and stress index were determined using Biolog FF plates and expressed as absorbance values. In a separate set up, *Rhizoctonia solani*, *Sclerotium rolfsii*, *Fusarium oxysporum* f.sp. *lycopersici* and *Phytophthora palmivora* were grown on amended potato dextrose agar for seven days. Radial growth, protein leakage, organic acid and morphological changes were determined through direct plate observation, UV-vis spectrophotometry, gas chromatography, fluorescent microscopy and scanning electron microscopy, respectively.

**Results:** The results indicated that CuO and ZnO do not have significant effects to CFU, respiration, growth and stress index to soil fungal community. Among fungal plant pathogens, *P. palmivora* was most susceptible to CuO in both bulk and nano-forms. *R. solani* and *S. rolfsii* were inhibited but recovered from the metal stress thereafter. *F.o.* f.sp. *lycopersici* showed cultural changes and decreased production of organic acids compared to control.

**Conclusion:** While CuO and ZnO showed toxicity, it is the nature of the compound and not particle size that provides the antifungal property in vitro. It is recommended that a range of sizes be used and that other measures of toxicity be employed to comprehensively account for the effects of CuO and ZnO NPs.