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# Effects of Cerium Oxide Nanoparticles on Glycine Max Grown in Hydroponics

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# Effects of Cerium Oxide Nanoparticles on *Glycine Max* Grown in Hydroponics

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Cerium oxide nanoparticles (NPs) or nanoceria have a high level of UV absorption and antioxidant behavior, making them great candidates for sun screens, beauty products, and in treating cancer and glaucoma. The increased use of these NPs underscores the importance of understanding their environmental fate and toxicity. So far, information about nanoceria toxicity to plants is scarce. The objectives of this study are to determine the effect of CeO<sub>2</sub> NPs on soybean (*Glycine max*) plant growth and monitor their uptake, deposition, and biotransformation. Soybean plants were treated for 14 days in a modified Hoagland solution containing varying concentrations of CeO<sub>2</sub> NPs (0, 500, 1000, 2000, and 4000 mg/L). Leaves, stems, and roots of the treated soybean plants were analyzed separately using ICP-OES and XAS. The ICP-OES results showed cerium concentrations in roots varying from 37068 - 74774 mg kg<sup>-1</sup>. In stems and leaves there was a maximum cerium concentration of 3028 and 1048 mg kg<sup>-1</sup>, respectively. XAS results suggest that soybeans absorb and store the nanoceria without any biotransformation. Increased growth and growth abnormalities in leaves were found in those plants treated with NPs. A high rate of translocation indicates promising use of soybeans in nanoceria phytoremediation.