Review of: "Synthesis, Characterization and Ameliorative Effect of Iron Oxide Nanoparticles on Saline-Stressed Zea Mays"

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Potential competing interests: No potential competing interests to declare.

This research explores the potential use of iron oxide nanoparticles (FeONPs), synthesized from Diodella sarmentosa leaf extract, to mitigate the negative effects of high soil salinity on Zea mays (maize) plants. The study addresses a significant agricultural challenge, as high soil salinity poses a threat to crop production and food security worldwide.

The synthesis of FeONPs using a green approach involving plant extracts is noteworthy due to its environmentally friendly nature. The characterization techniques employed, including FTIR, XRD, EDX, TEM, UV-vis, and SEM, provide a comprehensive understanding of the physical and chemical properties of the nanoparticles synthesized. The characterization results indicate the presence of polydisperse spherical FeONPs within a specific size range and with maximum light absorption at 380 nm.

The findings of the study demonstrate the effectiveness of the foliar application of FeONPs in ameliorating the negative impacts of soil salinity on Zea mays. The significant improvements observed in photosynthetic pigments, root length, and antioxidant enzyme activities suggest that FeONPs play a beneficial role in enhancing the growth and development of salt-stressed maize plants. Specifically, the substantial increase in chlorophyll content and carotenoid levels, along with enhanced root growth and antioxidant defense mechanisms, indicates a positive response of the plants to FeONP treatment under saline conditions.

Overall, this research suggests that FeONPs derived from Diodella sarmentosa leaf extract have the potential to serve as a promising nano-agricultural tool for mitigating the adverse effects of soil salinity on crop plants. However, further studies are needed to explore the mechanisms underlying the observed improvements and to assess the long-term effects and potential environmental implications of FeONP application in agricultural settings.