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Growth response of hydroponically cultivated lettuce plant to green synthesized silver nanoparticles

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Plant development is greatly impacted by nanoparticles at optimal concentrations. Small- and large-scale field experiments reveal how nanoparticles affect plant growth. It is clear that in the setting of these experiments, the dynamic properties of soil—which include elemental composition and microbiological constituents—also have a significant impact on plant growth. On the other hand, the hydroponic system offers a favorable environment that permits careful regulation of environmental parameters, making it possible to precisely monitor individual contributing factors like nanoparticles. Regarding such elements, the current study focuses on how silver nanoparticles affect the growth of hydroponically grown lettuce plants. The production of silver nanoparticles was carried out using clove leaf extract in an environmentally responsible and sustainable manner. The next step was a methodical characterisation using scanning electron microscopy, X-ray diffraction, zeta potential calculation, Fourier-transform infrared spectroscopy, and UV-visible spectroscopy. Afterwards, analysis of the lettuce plants' dose-dependent reaction to the previously indicated silver nanoparticles was conducted. The results of this study show that there is a beneficial effect on lettuce growth. Plant growth was shown to be enhanced by the treatment regimen that included a concentration of 1 mg L-1 of silver nanoparticles, which was found to be optimal.

Keywords: Green synthesis, silver nanoparticles, plant growth, hydroponics, lettuce