

## Effect of Silver Nanoparticles on Seed Germination of Crop Plants

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**Abstract :** The use of engineered nanomaterials has increased as a result of their positive impact on many sectors of the economy, including agriculture. Silver nanoparticles (AgNPs) are now used to enhance seed germination, plant growth, and photosynthetic quantum efficiency and as antimicrobial agents to control plant diseases. In this study, we examined the effect of AgNP dosage on the seed germination of three plant species: corn (*Zea mays* L.), watermelon (*Citrullus lanatus* [Thunb.] Matsum. & Nakai) and zucchini (*Cucurbita pepo* L.). This experiment was designed to study the effect of AgNPs on germination percentage, germination rate, mean germination time, root length and fresh and dry weight of seedlings for the three species. Seven concentrations (0.05, 0.1, 0.5, 1, 1.5, 2, and 2.5 mg/ml) of AgNPs were examined at the seed germination stage. The three species had different dose responses to AgNPs in terms of germination parameters and the measured growth characteristics. The germination rates of the three plants were enhanced in response to AgNPs. Significant enhancement of the germination percentage values was observed after treatment of the watermelon and zucchini plants with AgNPs in comparison with untreated seeds. AgNPs showed a toxic effect on corn root elongation, whereas watermelon and zucchini seedling growth were positively affected by certain concentrations of AgNPs. This study showed that exposure to AgNPs caused both positive and negative effects on plant growth and germination.

**Keywords :** *Citrullus lanatus*, *Cucurbita pepo*, seed germination, seedling growth, silver nanoparticles, *zea mays*

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