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Silver nanoparticles and silver ions: Oxidative stress responses and toxicity in potato (*Solanum tuberosum* L.) grown *in vitro***Ali Akbar Ehsanpour and Mozafar Bagherzadeh Homaei**
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Under *in vitro* conditions, we examined the effects of silver nanoparticles (AgNPs) and silver (Ag) ions on potato (*Solanum tuberosum* L.) in terms of silver accumulation, production of reactive oxygen species (ROS), oxidative stress responses, and antioxidant defense systems. At all concentrations (except for 2 mg.L⁻¹), the amount of Ag in the shoots and roots of Ag ion-treated plantlets was significantly higher than in plantlets treated with AgNPs. In both treatments, total ROS and superoxide anions were increased at concentrations greater than 2 mg.L⁻¹. Damage caused by oxidative stress, such as ion leakage and cell death was significantly higher in plantlets treated with AgNPs than those treated with Ag ions. Significant increase in the activities of superoxide dismutase, catalase, ascorbate peroxidase, and glutathione reductase (GR), were found in both AgNP-treated, and Ag ion-treated plantlets compared to the control. However, in AgNP-treated plantlets, GR activity was significantly decreased at 20 mg.L⁻¹. A significant reduction in glutathione (GSH), ascorbate (ASA), and the ratios of GSH to oxidized glutathione (GSSG) and ASA to oxidized ascorbate (DHA) were observed in plantlets treated with both AgNPs and Ag ions at concentrations higher than 2 mg.L⁻¹. Moreover, a greater decrease in GSH and ASA contents was seen in plantlets treated with AgNPs compared to those treated with Ag ions. The present study indicates that both AgNPs and Ag ion treatments impose oxidative stress on potato plantlets under *in vitro* conditions. Furthermore, based on plantlets response to oxidative damage, the observed alteration in the activities of radical scavenging enzymes and the depletion of GSH and ASA, AgNPs seem to have higher toxicity than the equivalent mass of Ag ions.

Biography

Ali Akbar Ehsanpour has more than 25 years of experience in evaluation of antioxidant systems in plants under *in vitro* stresses such as nano silver, salt and drought. Now, he has focused on nanoparticle toxicity in plants and is interested in toxicity of nanoparticle for human health.

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