

## Accepted Manuscript

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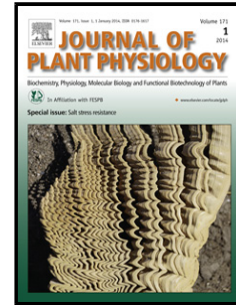
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**Alterations in *HO-1* expression, heme oxygenase activity and endogenous NO homeostasis modulate antioxidant responses of *Brassica nigra* against nano silver toxicity**

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Silver nanoparticles (AgNPs) are one of the most widely-used nanomaterials, which are toxic and can cause physiological disorders in plants. The aim of the present study was to investigate whether a possible signaling link between heme oxygenase (HO) and nitric oxide (NO) is implicated in alleviating the toxicity of AgNPs as well as AgNO<sub>3</sub>. The results showed that exposure to 400 mg L<sup>-1</sup> of AgNPs or AgNO<sub>3</sub> reduced the chlorophyll content and the growth parameters in *Brassica nigra*. Data on Ag accumulation as well as the evaluation of lipid peroxidation and the H<sub>2</sub>O<sub>2</sub> content in roots and shoots revealed that AgNP exerted more toxicity than AgNO<sub>3</sub>. Applying AgNP and AgNO<sub>3</sub>, respectively, increased HO transcripts by 87.5 and 37.3% and elevated the endogenous NO content 51.8 and 28.5%. The application of both hematin

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