PA-77

S-Nitrosoglutathione (GSNO) Alleviates Lead Toxicity in Soybean by Modulating ROS, Antioxidants and Metal Related Transcripts

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[Abstract]
Heavy metals, including lead (Pb) toxicity, are increasing in soil and are considered toxic in small amounts. Pb contamination is mainly caused by industrialization - smelting, mining. Agricultural practices - sewage sludge, pests and urban practices - lead paint. It can seriously damage and threaten crop growth. Pb can adversely affect plant growth and development by affecting the photosystem, cell membrane integrity, and excessive production of reactive oxygen species (ROS) such as hydrogen peroxide (H_2O_2)andsuperoxide(O_2.-). NO is produced via enzymatic and non-enzymatic antioxidants to scavenge ROS and lipid peroxidation substrates in terms of protecting cells from oxidative damage. Thus, NO improves ion homeostasis and confers resistance to metal stress. Our results here suggest that exogenous NO may aid in better growth under lead stress. These enhancements may be aided by NO's ability in sensing, signaling and stress tolerance in plants under heavy metal stress in combination with lead stress. Our results show that GSNO has a positive effect on soybean seedling growth in response to axillary pressure and that NO supplementation helps to reduce chlorophyll maturation and relative water content in leaves and roots following strong burst under lead stress. GSNO supplementation (200 μM and 100 μM) reduced compaction and approximated oxidative damage of MDA, proline and H_2O_2. Under plant tension, a distorted appearance was found in the relief of oxidative damage by ROS scavenging by GSNO application. In summary, modulation of these NO, PCS and prolongation of metal past reversing GSNO application confirms the detoxification of ROS induced by toxic metal rates in soybean. In summary, these NO, PCS and metal traditionally sustained rates of reverse GSNO application confirm the detoxification of ROS induced by toxic metal rates in soybean.

Keywords: Nitric oxide, S-Nitrosoglutathion (GSNO), reactive oxygen species, metal stress, stress tolerance

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