



Category: Plant Genomics

# Mining of genes involved in ROS maintenance and metal uptake in *Withania somnifera* (L.) Dunal under heavy metal stress (Cd)

**Bhawana Mishra and Neelam S. Sangwan**

CSIR-Central Institute of Medicinal and Aromatic Plants, Lucknow 226015, INDIA

Presenting author: [mishrabhawna990@gmail.com](mailto:mishrabhawna990@gmail.com)

## Abstract

*Withania somnifera* (L.) Dunal (Solanaceae), also known as Ashwagandha or winter cherry, is one of the most reputed Indian medicinal plants of the traditional Indian systems of medicines, is used in more than 100 formulations of Ayurveda, Unani and Sidha since over 3000 years. Ashwagandha has been used in curing of various diseases and possesses many pharmacological activities due to the occurrence of characteristic phytochemicals i.e. modified steroidal lactones called as withanolides. Cadmium (Cd) has been considered as harmful pollutant to the environment due to its high water solubility, mobility and long biological half-life. Cd is a potential threat to the plant as well as humans beings even at very low concentration. Cd has deleterious effect on plant growth and development. Plants induce various biochemical responses including enzymatic and non-enzymatic antioxidants to minimize the heavy metal toxicity. As the plants are incessantly exposed to essential as well as non-essential heavy metals and have capability to uptake both metals from their environment (growing medium), present work was carried out to evaluate the genes involved in ROS homeostasis and heavy metal uptake including profiling of various other biochemical responses of *W. somnifera* grown under glass house conditions supplemented with exogenous gradient concentration Cd. The various enzymatic and non-enzymatic parameters were analyzed related to ROS determination and Cd deposition in tissues. Along with these analyses, several genes were mined out from the transcriptome of *W. somnifera* involved in ROS homeostasis and heavy metal uptake. Conserved regions of various ROS genes were taken for their expression analysis in Cd treated shoots to know their involvement against Cd stress. Various *in silico* and wet lab studies of gene involved in heavy metal uptake were also conducted for its structural and functional validation. This study revealed that the Cd affects substantially various active growth parameters as well as enzymatic and, non-enzymatic antioxidative responses. Results also revealed the suspected genes involved in ROS homeostasis maintenance and the heavy metal uptake in ashwagandha against Cd stress which will be discussed in detail during the presentation.

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