

6th World Congress on **Biotechnology**

October 05-07, 2015 New Delhi, India

Impact of heavy metal stress on *in vitro* plant productivity, evaluation of anti-oxidative enzymes, ultra-structural changes, protein profiling and DNA damage in *Cassia angustifolia* Vahl, a medicinal legume

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The presence of heavy metals in the environment is one of the major concerns because of their bio-accumulating tendency and toxicity. In this study, *Cassia angustifolia* Vahl was grown on Knop's basal medium supplemented with various concentrations (0, 1, 10, 50, 100, 200 mg L⁻¹) of heavy metals (ZnSO₄ and CuSO₄) to understand the anti-oxidative enzymes, metal accumulation and DNA damage at cellular level. Average root and shoot length decreased with increasing metal concentration. Atomic Absorption Spectroscopy revealed that maximum accumulation of metal was 643.62 mg kg⁻¹ and 1634.23 mg kg⁻¹ in shoots, while in roots, it was 1682.49 mg kg⁻¹ and 9516.99 mg kg⁻¹ at 200 mg L⁻¹ Zn and Cu treated seedlings, respectively. A significant increase in anti-oxidative enzymes SOD, CAT, APX, GPX and GR was observed under both metal treatments. MDA exhibited 2.5 and 3.33 fold increase and proline accumulation increased up to 9.42 and 11.20 fold over control at 200 mg L⁻¹ Zn and Cu, respectively. SEM images showed that Zn and Cu both had an adverse effect on leaf ultra-structure above 10 mg L⁻¹ Zn and Cu treatment. Trypan blue staining of leaves showed increased cell death at 200 mgL⁻¹ Zn and Cu. HPLC analysis of sennosides revealed that maximum sennoside A content accounted for 175.19 mgg⁻¹ FW at 1 mgL⁻¹ Cu whereas sennoside B accounted for 30.0 mgg⁻¹ FW at 100 mgL⁻¹ Cu treatment. Comet assay showed extensive DNA damage above 10 mgL⁻¹ Zn and Cu. SDS-PAGE analysis showed increased synthesis of low molecular weight proteins (20-14 kDa) at higher concentration of Zn and Cu. Our results suggest that *C. angustifolia* has high metal accumulating potential which can be utilized for phytoremediation process.

Biography

Rajeshwari is currently pursuing her PhD in the Department of Botany, University of Delhi, India. She is a Post graduate in Botany from Banaras Hindu University, Varanasi. She has presented a in Indian Science Congress, 2015 and currently working on heavy metal stress in *Cassia angustifolia* Vahl.

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