

# PLANT SCIENCE AND BIOLOGY

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## Lead Induced Modulation in Growth, Chlorophyll Pigment, Nutrient Uptake, Antioxidant Enzyme Regulation, Gene Expression, and Fruit Quality in Two Tomato Cultivars

**Iqbal Hussain\* , Zarbakht Afzaal , Saima Riaz**

Department of Botany, Government College University, Faisalabad-38000, Pakistan

**M**etal stress is one of the major restrictions for agricultural production. A pot experiment was set-up to appraise modulation in growth, oxidative defense, secondary metabolism and relative gene expression of two tomato cultivars viz. Roma (sensitive) and Nagina (tolerant) at flowering stage in response to different lead ( $Pb^{2+}$ ) regimes (160, 320, 640 and 1280  $\mu M$ ). The results showed that  $Pb^{2+}$  stress (1280  $\mu M$  Pb) caused a considerable reduction in growth attributes, chlorophyll (Chl.) pigments and ascorbic acid contents, and increase in malondialdehyde (MDA), hydrogen peroxide ( $H_2O_2$ ), and total soluble protein (TSP) contents in both cultivars. A significant enhancement in ascorbate peroxidase (APX), peroxidase (POD), catalase (CAT) activities and Cat2 gene expression was documented in  $Pb^{2+}$  stressed tomato plants. Fruit quality of Nagina was better than Roma cultivar. In this context, higher fruit ash contents, protein contents, fructose and glucose contents were observed in Nagina, while Roma was inferior in this regard when under  $Pb^{2+}$  stress. Furthermore,  $Pb^{2+}$  reduced the fresh and dry biomass, moisture, fiber content and mineral ( $Na^+$ ,  $K^+$  and  $Ca^{2+}$ ) uptake in tomato fruits of both cultivars. The results indicated that significant amount of  $Pb^{2+}$  accumulates in the root compared with its concentration in shoot and leaves while only a small amount of  $Pb^{2+}$  reaches the fruit. The exposure to  $Pb^{2+}$  caused significant changes in Cat2 gene transcripts indicating the contribution of this gene in  $Pb^{2+}$  tolerance. The sensitive cultivar exhibited higher oxidative damage, decreases in the concentration of essential nutrients, poor oxidative defense system, and thus had low quality of fruit.

**Keywords:** Enzyme activity; Gene expression; Lead regimes; Oxidative stress; Tomato

### Biography:

He has been working as Tenured Associate Professor in the Department of Botany, Government College University, Faisalabad-38000, Pakistan Since 17-12-2017 to date. Earlier to it, he has served this university as Assistant Professor (TTS) from 02-12-2011 to 16-12-2017 and Assistant Professor under HEC's Interim Placement of Fresh PhDs Program (IPFP) from 04-01-2011 to 01-12-2011.