## Microalgae as Promising Biostimulants of Plant Tolerance Against Heavy Metals

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**Abstract**: Heavy metals contamination is a major environmental concern around the world. It has a harmful impact on plant productivity and poses a serious risk to humans and animals health. In the present study, the effect of Microalgae Crude Extract (MCE) on tomato growth and nutrients uptake exposed to 2 mM Pb2+ and Cd2+ was investigated. In results, 2 mM Pb2+ and Cd2+ showed a significant reduction of tomatobiomass and perturbation in nutrients absorption. Moreover, MCE application in tomato plant exposed to Pb2+ and Cd2+ showed a significant enhancement of biomass compared to tomato plants under Pb2+ and Cd2+. On the other hand, MCE application favoured heavy metals accumulation in root and inhibited their translocation to shoot as phytostabilisation mechanism. Tomato plants showed biochemical responses to Pb2+ and Cd2+ stress with elevation of scavenging enzymes and molecules such as POD, CAT, SOD, Proline, and polyphenols, etc. In addition, the treatment by MCE showed a significant reduction level of the majority of these parameters. Furthermore, the metabolomic analysis revealed a significant change in important metabolites. Pb2+ and Cd2+ showed decrease in SFA and increase of UFA, VLFA, alkanes, alkenes, sterols, which known accumulated as tolerance and resistance mechanism to heavy metal (H.M) stress. However, MCE treatment showed the inverse of these response to return tomato plants to normal state and enhanced tolerance and resistance to heavy metal stress. In the present study, we emphasized that MCE can alleviate H.M stress, enhance tomato plant growth nutrients absorption and improve biochemical responses.

**Keywords :** microalgae crude extract, heavy metal stress, nutrient uptake, metabolomic analysis, solanum lycopersicum (Tomato), phytostabilisation

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