

Anatomical Adaptations and Mineral Elements Allocation Associated with the Zn Phytostabilization Capability of *Acanthus ilicifolius* L.

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Abstract : The phytostabilization potential of a halophyte *Acanthus ilicifolius* L. has been evaluated with special attention to the nutritional as well as anatomical adaptations developed by the plant. Distribution of essential elements influenced by the excess Zn^{2+} ions in the root tissue was studied by FEG-SEM EDX microanalysis. Significant variations were observed in the uptake and allocation of mineral elements like Mg, P, K, S, Na, Si and Al in the root of *A. ilicifolius*. The increase in S is in correlation with the increased synthesis of glutathione which might be involved in the biosynthesis of phytochelatins. This in turn might be aiding the plant to tolerate the adverse environmental conditions by stabilizing the excess Zn in the root tissue itself. Moreover it is revealed that most of the Zn were accumulated towards the central region near the vascular tissue. Treatment with $ZnSO_4$ in *A. ilicifolius* caused significant increase in the number of glandular trichomes on the adaxial leaf surface as compared to the leaves of control plants. In addition to this, *A. ilicifolius* when treated with $ZnSO_4$, exhibited a deeply stained layer of cells immediate to the endodermis, forming more or less a ring like structure around the xylem vessels. Phloem cells in these plants were crushed/reduced in numbers. There were no such deeply stained cells forming a ring around the xylem vessels in the control plants. These adaptive responses make the plant a suitable candidate for the phytostabilization of Zn. In addition the nutritional adjustment of the plant equips them for a better survival under increased concentration of Zn^{2+} .

Keywords : *Acanthus ilicifolius*, mineral elements, phytostabilization, zinc

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