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## Phytotoxicity Of Cadmium: Recent Advances And Future Prospects

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### ABSTRACT

*Heavy metals are important environmental pollutants and their toxicity is a problem of increasing significance for ecological, evolutionary, nutritional and environmental reasons. Heavy metal contamination of soil and water is one of the most serious environmental problem across the world due to their toxicity to human, animals, plants and microbes. Cadmium (Cd) is a trace element ubiquitous in the soil. However, anthropogenic activities such as the non-ferrous metal industry, mining, production, use and disposal of batteries, metal-contaminated wastes and sludge disposal, application of pesticides and phosphate fertilizers lead to dispersion of Cd. This non-essential element is taken up through the roots of many species and accumulated in all the plant parts including root, shoot, fruit and grain. Taken up in excess, Cd becomes poisonous and can cause serious health hazards to most living organisms. Cadmium accumulation through the tropic levels of the food chain constitutes a risk for humans. Cd directly or indirectly inhibits physiological processes such as respiration, photosynthesis, water relations and gas exchange. Cd may be preferentially accumulated in chloroplasts. Photosynthesis is inhibited at several levels. Cadmium disturbs cellular redox environment of the root causing oxidative stress. Various parts of root metabolism are affected as a consequence of Cd, including water and nutrient uptake and inhibition of several enzyme activities. Cd is also responsible to reduce nitrate reductase activity, carbonic anhydrase activity and proline content. Although our knowledge of Cd toxicity in higher plants as well as in the soil plant system has increased considerably in the recent years, there are still many gaps in our knowledge about the basic mechanisms that control Cd movement and its accumulation in plants. Certainly more research is needed regarding the mechanism of Cd uptake by the root, translocation, and its deposition within the plants. Additionally, the major forms of Cd in various staple plant foods need to be identified. This review emphasises cadmium toxicity on plants with regards to ecological, physiological and biochemical aspects.*

**Keywords:** Oxidative stress, photosynthesis, respiration, cadmium toxicity, reductase, anhydrase, anthropogenic

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