



Transgenic Plant Technology for Remediation of Toxic Metals and Metalloids

Edited by
Majeti Narasimha Vara Prasad



Remediation of Potentially Toxic Elements Through Transgenic Plants: *In Vitro* Studies and the Way Forward

Mohamed Cassim Mohamed Iqbal¹ and Sithy Sabeera Iqbal²

¹Plant and Environmental Sciences, National Institute of Fundamental Studies, Kandy, Sri Lanka,

²Department of Chemistry, The Open University of Sri Lanka, Nawala, Sri Lanka

6.1 INTRODUCTION

Using green plants to remove pollutants from our environment is a very old technology. An early reference to this was the observation, by the German botanist A. Baumann in 1845, that plant species growing in soil naturally enriched in Zn accumulated high levels of this element in their leaves (Salt et al., 1998). Since then many species have been identified capable of absorbing different heavy metals from the soil environment.

6.1.1 Toxic Metals and Metalloids in the Environment

Emission of toxic heavy metals and metalloids has risen tremendously and significantly exceeds those from natural sources for practically all metals (Prasad, 2004; Clemens, 2006). Of the numerous anthropogenic activities,

mining operations are potential sources of airborne metal and metalloid contaminants through both direct smelter emissions and wind erosion of mine tailings (Csavina et al., 2012) where fine particulates from smelting operations may disperse more readily into the environment than coarser tailings dust. Contaminants can be transported rapidly and over relatively long distances by atmospheric dust and aerosol relative to other media such as water, soil, and biota (Csavina et al., 2012).

The impact of abandoned mine wastes on the levels of metals and metalloids in the atmosphere decreases with increasing distance from the mine waste deposits (Castillo et al., 2013).

Large-scale Pb/Zn alloy smelters have also contributed to elevated levels of trace elements in street dust samples as reported from a heavily industrialized city in central China (Li et al., 2013). Such smelt also causes heavy metals (Hg, Pb, Zn, Cd) and metalloid (As)