IDENTIFICATION OF VEHICULAR EMISSION HYPER ACCUMULATOR AND ITS SUBSEQUENT USE AS PHYTOREMEDIATION

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Abstract

Effects of vehicular emission on two plants *Amaranthus spinosus* Linn. and *Croton bonplandianum* Baill, collected from polluted site and from relatively less polluted site/control site of Kolkata city of West Bengal, India was studied. Photosynthetic pigment content, proline content, phosphatase activity and Hill activity, heavy metal contents and their relevance to be used as phytoremediators was investigated. Decrease in pigment content and increase in proline content and phosphatase activity was observed in the plants from polluted areas. Micromorphological studies revealed the effect of automobile emission on epidermal cells and stomatal size on both the experimental plants. Data indicated that between the two plants, *A. spinosus* was more susceptible and *C. bonplandianum* was more tolerant to vehicular pollution.

Introduction

Vehicle exhausts as well as industrial emission contribute to air pollution due to incomplete combustion of carbon containing fuels which cause formation of various gases, liquids and solid particles. Although several physical and chemical techniques are available for environmental cleanup, huge cost, low efficiency, labour requirement and generation of harmful by-products hinder their applications. To overcome the disadvantages associated with the conventional methods, researches are being focussed on phytoremediation. Thus, plants provide one of the most effective and natural ways of removing atmospheric pollutants by absorption and accumulation of gaseous and particulate matter (Varshney 1985) and various plants have thus been explored for this purpose (Joshi *et al.* 1997, Ghafari *et al.* 2020).

Based on adsorption/absorption of air pollutants, plants have been categorized as sensitive, intermediate and moderately tolerant (Singh *et al.* 1991). While sensitive plants act as indicators, tolerant plants serve as sink to atmospheric pollutants. Generally, analysis of a combination of biochemical and physiological parameters are more effective in indicating pollution induced changes in plants than any individual parameter. Therefore, a number of factors like chlorophyll, carotene and xanthophyll content, Hill activity, proline content, acid phosphatase and alkaline phosphatase activity, of leaves as well as Pb, Cd, Co, Ni content of soil and plant materials were considered in this study. Here, these concepts were applied to study the impact of traffic related air pollutants on roadside vegetation of Kolkata city. In the present investigation, the impact of pollution on selected foliar micromorphological and biochemical parameters of *A. spinosus* and *C. bonplandianum* were evaluated. The present work was aimed at identifying the vehicular emission hyper accumulator plant among the two plants, in order to use them for phytoremediation.

Materials and Methods

Plants were sampled from either side of the highway, Barackpore Trunk Road, near Sinthee more, Cossipore, having close proximity to thermal power plants (polluted site) and from garden of Ballygunj Science College, a residential area (relatively less polluted site/control site) of

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