RESEARCH PAPER

Plant leaf as pollution monitoring device

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ABSTRACT

Biological effect monitoring of urban industrial pollutants was carried out using an air pollution tolerance index (APTI) of plants. For this purpose, the four leaf parameters namely, ascorbic acid, chlorophyll, relative water content and leaf extract pH were combined together in a formulation signifying the APTI of plants. The index indicated the plant response at the cell membrane and chloroplast levels. Sampling sites P_1 and P_2 are situated in western parts of Dindigul near the junction of national highways and industries. The control site was selected as Lakshmanapuram to categorize plants as sensitive or resistance. Air pollution tolerance index was calculated. The APTI showed a marked gradation as the pollutant load decreased from zone P_1 and P_2 to the control site (P_3). The APTI can be used as a good indicator to find the impact of pollution on plants.

Key Words : Urban industrial pollutant, APTI, Total chlorophyll, Ascorbic acid, Leaf extract pH, Relative water content (RWC)

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Rapid industrialization, urbanization and traffic density cause atmospheric pollution all over the country. Vegetation plays the role of major sink of atmospheric dust containing a fair amount of highly toxic heavy metal particles. Air pollution is one of the severe problems worlds facing today. It deteriorates ecological condition and can be defined as the fluctuation in any atmospheric constituent from the value that would have existed without human activity. Various efforts have been done for environmental restoration in India but still it seems to be a formidable task. Dindigul town is no exception. Its environment has undergone irreparable damage due to the population growth and its subsequent requirements in terms of housing and traffic density continuously increasing road traffic is a primary culprit. The changed ambient environment due to the air pollutants in urban area of Dindigul which has exerted a profound influence on the morphological, biochemical and physiological status of plants, and therefore its responses.

The responses of plants to pollutants provide a simple and low cost method of monitoring gaseous pollutants (Posthumus, 1985). However, to use plants as bio indicators, a proper selection of plant characteristics is of vital importance. A number of plant parameters has been used individually for the purpose, *viz.*, visible foliar injury (Davis and Wilhour, 1976), membrane permeability (Farooq and Beg,1980), ascorbic acid (Keller and Schwager, 1977), relative water content (Rao, 1979), chlorophyll content (Bell and Mudd,1976) , leaf extract pH (Chaudhary and Rao, 1977) and peroxides activity (Eckert and Houston,1982). Usually for biological effect monitoring, pollution induced changes in individual parameters of plants are quantified and correlated with level of pollutants. However, evaluation of plant response based on single criterion alone may not be feasible in the complex circumstances of an urban industrial environment where a variety of unspecified pollutants present.

Work have been done in the direction to study the sensitivity of plants based on the selected parameters such as ascorbic acid, relative water content (RWC) chlorophyll

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