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A Case Study :

Air pollution tolerance index of tree sepcies growing in traffic area of Madurai, Tamil Nadu

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ABSTRACT

Air pollutant from vehicles affect tree by injuring and killing them, and by adversely affecting physiological processes so as to decrease growth without necessarily causing visible symptoms of injury. In the present study, the four leaf parameters such as pH, relative water content, total chlorophyll and ascorbic acid for the five tree species such as *Peltophorum ferrugineum*, *Pongamia glabra*, *Polyalthia longifolia*, *Tectona grandis* and *Ailanthus excelsa* in three different sampling stations such as residential area, commercial cum heavy traffic area and less traffic area has been monitored. The air pollution tolerance index (APTI) has been evaluated, incorporating the biochemical parameters to categorize the plants as sensitive or resistant to air pollutants. The analysis of the parameters show that all the four parameters are high in the residential area compared to the sampling stations exposed to automobile exhaust. It reveals that the air pollutants from the vehicles enter the plants through the natural opening usually stomata and react within leaf tissues. They do not cause tissue death but inhibit leaf function.

Key words : Ascorbic acid, Chlorophyll content, Air pollution tolerance index, Biochemical parameter

In the recent years, the concern about environmental pollution has grown appreciably. It has come to be recognized as one of the major threats to the existence of human and various other species of our planet. Air pollution deteriorated the ecological condition and would be defined as the fluctuation in any atmospheric constituent from the value that would have existed without human activity. It is really concerned because the accumulation of pollutants is more in the areas where there is higher concentration of people and traffic congestion. Emissions from heavily loaded and badly maintained automobiles, domestic and industrial combustion of coal and other industrial emission account for most of the urban pollution in India.

Mainly automobile exhaust contribute significantly about 80 per cent carbon monoxide emission. Its concentration vary depending upon the density of vehicular traffic. Its level is much below the threshold concentration in areas where traffic is less. It has detrimental effects on plants, when exposed for a long time. It affects leaf drop, leaf curling, reduction in leaf size and chlorophyll. Automobile exhausts emit maximum hydrocarbons in the atmosphere. In India, automobiles are the chief source of hydrocarbon. About 40 per cent of the vehicular exhaust hydrocarbons are unburnt fuel components. It has adverse effects on vegetation. It inhibit plant growth and damage leaf tissues and death of flowering plants.

Madurai city is the trade and commercial center of south region of Tamil Nadu. The current population of the city stands at 11 lakh. Urban Madurai is a depositary for most of the pollutants in the air. This study is intended to biomonitor five tree species such as *Peltophorum ferrugenium*, *Pongamia glabra*, *Polyalthia longifolia*, *Tectona grandis* and *Ailanthus excelsa* at various sites along the roadside of city exposed to vehicular emissions.

MATERIALS AND METHODS

Selection of sampling stations:

Historically as well as mythologically, Madurai is perhaps the oldest city in Tamil Nadu. Madurai is the second largest city in Tamil Nadu state. It has three national Highways namely NH-7, NH-45B, NH-49 and state highways passing through it (Fig. 1). During summer, the temperature varies from a maximum of 39.1^{0}C to a minimum of 25.0^{0}C and during winter, the temperature changes from a maximum 29.0^{0}C to a minimum 20.0^{0}C. The city is emerged as an important center of textiles and engineering industries. It is also fast growing center for tourism, having high traffic column.

The sampling stations are selected keeping in view of the importance of the zone and the nature of activity. A total of three sampling stations consisting of residential, commercial and traffic intersections are chosen for the present study. Avaniyapuram is a purely residential area and a very much traffic free zone of urban city. Integrated Bus stand (Roadside sampling site 1) is at a busy traffic