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Research Paper :

Induced changes of photosynthetic pigments in selected plant species due to cement dust pollution

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ABSTRACT

Plants are the only living organisms which have to suffer a lot from cement dust pollution, because they remain static at their habitat. In the present study, the estimation of Chlorophyll 'a', Chlorophyll 'b' and total carotenoid pigments were studied in three different species such as *Azhadirachta indica*(L), *Polyalthia longifolia*(L) and *Ficus religiosa*(L). Extraction was made using 100 per cent acetone and spectrophotometric determination was carried out. The selected plant species was exposed to the cement dust pollution. Variation in Chl'a', Chl'b' and carotenoid were found out from the plant species which were exposed to the cement dust pollution on various days such as 30, 60, 90, 120, 150 and 180 days. *Ficus religiosa*(L) was found to be more affected compared to the remaining species. This variation can be used as indicators of the air pollution for early diagnosis of stress caused by the pollution. The findings implied that cement dust pollution reduced the photosynthetic capacity of the plants. The reduction in photosynthetic pigments corresponds directly to the reduction in plant growth.

KEY WORDS : Cement dust, Bio-indicators, Photosynthetic pigments, Chlorophyll, Carotenoids, Leaf extraction, Spectrophotometric determination and acetone

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The impact of the atmospheric pollution on the ecosystems was demonstrated at several times (Bliefert and Perraud, 2001; Grantz, *et al.*, 2003). Otherwise, this form of pollution is caused by industrial activities including the cement industry. The main impact of the cement activity on the environment is the broadcasts of dust and gases. These particles or dust are very numerous and varied. This diversity is assigned to different sources of broadcast (Laj and Sellegri, 2003). Plant response to air pollution can be used to assess the quality of air that may provide early warning signals of air that may provide early warning signals of air pollution trends (Wagh *et al.*, 2006). Plants enormous provide an enormous leaf area for impingement, absorption and accumulation of air pollutants to reduce the pollution level in the air environment (Escobedo *et al.*, 2008), with a various extent for different species (Hove *et al.*, 1999). Presence of trees in the urban environment can thus improve air quality through enhancing the uptake of gases and particles (McPherson *et al.*, 1994; Beckett *et al.*, 1998, Smith *et al.*, 2005). Of all the plant parts, the leaf is the most sensitive part to air pollutants and several other such external factors (Lalman and Singh, 1990). Removal of pollutants by plant from air by three processes, namely deposition of particulates, absorption by leaves and aerosols over leaf surface (Prajapti and Tripathi, 2008).

The chlorophylls, Chl 'a' and Chl '*b*', are virtually essential pigments for the conversion of light energy to stored chemical energy. The amount of solar radiation absorbed by a leaf is a function of the photosynthetic pigment content; thus, chlorophyll content can directly determine photosynthetic potential and primary production (Curran *et al.*, 1990, Filella *et al.*, 1995). In addition, Chlorophyll gives an indirect estimation of the nutrient status because much of leaf nitrogen is incorporated in chlorophyll (Filella *et al.*, 1995, Moran *et al.*, 2000). Furthermore, leaf chlorophyll content is closely related to plant stress (Hendry 1987, Merzlyak and Gitelson 1995, Peñuelas and Filella 1998, Merzlyak *et al.*, 1999). Traditionally, leaf extraction with organic solvents and spectrophotometric determination in solution is required for pigment analysis with wet chemical methods (e.g.,