

RESEARCH PAPER:

Effect of cement dust on photosynthetic pigments of selected plant species

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SUMMARY

The study aimed to appraise the effect of cement dust pollution on photosynthetic pigments of selected plant species. Changes in the concentration of different photosynthetic pigments like chlorophyll 'a', chlorophyll 'b', total chlorophyll and total carotenoids were determined in the leaves of selected plant species exposed to cement dust pollution. The plant species selected for the study were *Azadirachta indica*, *Polyalthia longifolia*, *Ficus religiosa*, *Pongamia pinnata* and *Delonex regia*. Reduction in chlorophyll 'a', chlorophyll 'b', total chlorophyll and total carotenoids were recorded in the leaf samples of all selected cement dusted plant species and compared with non-dusted plant species. The data obtained were further analyzed by using two-way ANOVA and also obtained significant changes in all the parameters from the polluted plant species compared with control. There was maximum reduction (43.32%) of chlorophyll 'a' in the leaves of *Ficus religiosa* and minimum (22.92%) reduction in *Azadirachta indica* while maximum reduction (41.85%) of chlorophyll 'b' was depleted in *Delonex regia* and minimum reduction (25.39%) in *Azadirachta indica*. The highest reduction (51.81%) in total chlorophyll was observed in *Delonex regia* whereas the lowest reduction (24.67%) was recorded in *Azadirachta indica*. Similarly, in case of carotenoid contents, highest reduction (65.55%) was observed in *Pongamia pinnata* and lowest in *Ficus religiosa* (29.01%).

Key Words :

Cement dust,
Bio-indicators,
Photosynthetic
pigments,
Chlorophyll,
Carotenoid,
Assimilating
pigments

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Air pollution is a major problem arising mainly from industrialization (Odilara, *et al.*, 2006). Air pollution can directly affect plants via leaves or indirectly via soil acidification (Steubing, *et al.*, 1989). It has also been reported that when exposed to air pollutants, most plant experience physiological changes before exhibiting visual damage to leaves (Dohmen, *et al.*, 1990). Air pollutants, responsible for vegetation injury and crop yield losses, are causing increased concern (Fuji, 1973). Air pollution has become a major threat to the survival of plants in the industrial areas (Gupta and Mishra, 1994). Rapid industrialization and addition of the toxic substances to the environment are responsible for altering the ecosystem (Mudd and Kozlowski, 1975; Niragau and Davidson, 1986; Clayton and Clayton, 1982). The Cement industry plays a vital role in the imbalances of the environment and produces air pollution hazards (Stern, 1976).

In comparison with gaseous air pollutants, many of which are readily recognized as being the cause of injury to various types of vegetation, relatively little is known and limited studies have been carried out on the effects of cement dust pollution on the growth of plants.

The pollutants when absorbed by the leaves that can cause a reduction in the concentration of photosynthetic pigments *viz.*, chlorophyll and carotenoids, which directly affect to the plant productivity. Chlorophyll is the principal photoreceptor in photosynthesis, the light-driven process in which carbon dioxide is "fixed" to yield carbohydrates and oxygen. Carotenoids are a class of natural fat-soluble pigments found principally in plants, algae and photosynthetic bacteria, where they play a critical role in the photosynthetic process (Ong and Tee, 1992; Britton, 1995) and also protect chlorophyll from photo oxidative destruction (Siefermann-Harms, 1987). When plants are