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PLANT SCIENCE

Effect of autoexhaust emission on germination and seedling growth of an important arid tree *Cassia siamea* Lamk.

Muhammad Shafiq* and Muhammad Zafar Iqbal

Department of Botany, University of Karachi, Karachi, 75270, Pakistan

Abstract

Automobile exhaust emission showed toxic effects on seed germination and seedling growth of *Cassia siamea*. Germination and growth of *C. siamea* seeds was significantly ($p<0.05$) affected in seeds collected from M. A. Jinnah Road, Sharah-e-Faisal, Nazimabad, and Gulshan-e-Iqbal as compared to University campus. The seeds of *C. siamea* collected from the Karachi University campus, which is considered as control site showed better percentage of seed germination and seedling growth as compared to the seeds of the same species collected from the city area. Higher percentage of decrease in seed germination was found for seeds collected from M. A. Jinnah road, followed by Shahrah-e-Faisal, Nazimabad, and Gulshan-e-Iqbal as compared to control. Seedling length and root length was also highly decreased for seeds of same species collected from M. A. Jinnah road as compared to control. High percentage of decrease in seedling dry weight was found for seeds of same species collected from M.A. Jinnah road, followed by Shahrah-e-Faisal, Nazimabad, Gulshan-e-Iqbal as compared to control. According to tolerance test it was observed that seedling growth of *C. siamea* showed lowest percentage of tolerance in samples collected from M. A. Jinnah Road followed by Sharah-e-Faisal, Nazimabad and Gulshan-e-Iqbal as compared to Campus.

Key words: Automobile exhaust emission, *Cassia siamea*, Pollution, Seeds, Tolerance

Introduction

Karachi is the largest industrial city of Pakistan. The transport system consists of buses and minibuses as a primary mode of conveyance. According to traffic engineering bureau (TEB) in Karachi, a total number 1355,972 all kind of vehicles were registered with the motor vehicle registration department in Sindh till June 2005 (Mohiuddin, 2005). Pakistan is plagued with environmental problems due to unlimited population growth and unchecked vehicular emissions (Wahid, 2006). These toxic materials such as carbon particles, unburned and partially burned hydrocarbons, fuels, tar materials, lead compounds and other elements which are the constituents of petrol and lubricating oils deposit on the surface of plants. These pollutants in combinations cause greater or synergistic effects to plants. Toxicity of mixed chemicals is not always equal to the sum of those by the individual chemicals (Nagata et al., 2008).

Emissions from automobiles and trucks operating on public roads represent a major portion of the air pollutants included in emission inventories (Skiba and Davydova-Belitskaya, 2003). Trees in cities faces an exceptionally stressful growing environment such as air pollution, environmental degradation, pressure for land space, traffic congestion, destruction of trees and green areas to accommodate urban development which suppresses performance and shorten life span (Jehan and Iqbal, 1992; Sawidis et al., 1995; Jim, 1998). The pollutants emitted from the autoexhaust adversely affect the germinability of seeds (Türkan, 1988; Mehmood and Iqbal, 1989; Qadir and Iqbal, 1991). Automobile activities has increased the level of metals in the environment of the major cities of the world and produced ill effects on plant growth (Abdullah and Iqbal, 1991; Al-Saleh and Taylor, 1994; Alfani et al., 1996: Ara et al., 1996; Hussain et al., 1997; Alam and Ahmad, 1998; Aksoy and Sahln, 1999; Aksoy et al., 2000; Shafiq and Iqbal, 2007). Vehicular traffic is one of the major sources of heavy metal contamination, either in soils or roadside dusts in urban areas, and it has increased in the last years (Colvile et al., 2001: Celik et al.,

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*Corresponding Author

Muhammad Shafiq
Department of Botany, University of Karachi, Karachi, 75270, Pakistan

Email: shafiqeco@yahoo.com