

Air pollution tolerance index of few plant species affected by auto exhaust pollution around Haridwar

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Abstract

Present study was carried out to determine level of tolerance of air pollution by automobile exhaust of few tree species viz. Mango (*Mangifera indica*), Sagon (*Tectona grandis*), Sal (*Shorea robusta*) and Eucalyptus around Haridwar. On the basis of total chlorophyll content, ascorbic acid, pH, and relative moisture content, air pollution tolerance index value (APTI) of above tree species was determined. Highest value of air pollution tolerance index for polluted site was recorded for Sal (11.27) and lowest (7.19) value of APTI was recorded for Eucalyptus, whereas in control site, highest value (7.93) value of APTI was observed for Sagon (*Tectona grandis*) and lowest value (6.01) for Mango (*Mangifera indica*). Thus this study reveals that *S. robusta* is more suitable species to work as pollution sink and can be planted in areas, which are facing vehicular pollution.

Key words : Air pollution tolerance index (APTI), Automobile pollution, Photosynthetic pigments, Ascorbic acid.

Introduction

Automobile exhaust is the major cause of air pollution. It contributes 70% towards the air pollution as compared to any other sources of air pollution. Air pollution due to vehicular exhaust is not only the problem of big metro cities but it has become serious problem in small cities too. Automobile exhaust affects human as well as plant life. In case of plants chlorosis, necrosis, and inhabitation of plant metabolites are the common effects.

It has been suggested that plants have an excellent power to sink air pollution, which depends upon the level of tolerance of air pollution (Tiwari and Rai, 2000). Present study has been carried out to determine air pollution tolerance index (APTI) of some of the tree species.

Material and Methods

Present study is carried out around Haridwar. Four different tree species viz. Mango (*Mangifera indica*), Sagon (*Tectona grandis*), Eucalyptus and Sal (*Shorea robusta*) were selected for determination of APTI. Plant samples were collected just near roadside and 100 m out side the road.

Determination of Different Parameters

Chlorophyll contents of plant samples were analyzed using method proposed by Arnon (1949). pH and relative moisture content were determined as per Trivedi and Goel (1983). Ascorbic acid was estimated by the method of Sadasivam and Manikam (1991). Air pollution tolerance index was estimated by Singh and Rao (1983) method.

Discussion

Table -1 shows data on different plant parameters affected by automobile emission in comparison to control area.

Highest value of total chlorophyll content was found in *Mangifera indica* (10.01) whereas lowest value was found in *Tectona grandis* (2.35) in the polluted site. In case of control site highest value of total chlorophyll content was found in *Mangifera indica* (8.60) whereas lowest value was found in *Eucalyptus* (2.21). Garthy (1985) observed that decrease in chlorophyll content was at site affected by heavy traffic whereas sites with low traffic recorded a lower decreases in chlorophyll content.

In case of ascorbic acid at polluted site, highest value was found in *Shorea robusta* (2.00 mg/g), whereas lowest value of ascorbic acid was found in *Tectona grandis* (1.28 mg/g). Highest value of ascorbic acid in control area was found in *Tectona grandis* (2.76 mg/g) and lowest value of ascorbic acid was found in *Eucalyptus* (1.44 mg/g).

A decrease in ascorbic acid in the polluted site as compared to control is due to the impact of SO_2 . Ascorbic acid is powerful reductant, responsible for the photo reduction of photochlorophyllide (Rudolph and Bukatsch, 1956) and its reduction power depends on its concentration. pH of polluted site plant show deviation towards acidic side, which may be due to the NO_2 and SO_2 .

The various factor of APTI such as ascorbic acid and all other factors as chlorophyll, leaf pH, and relative water content generally show depletion under stress. Plants, which can resist this depletion, become air pollution resistant. The highest air pollution tolerance index value was calculated by using formula of Singh and Rao (1983) observed in *Shorea robusta* (11.27) and lowest in *Eucalyptus* (7.19) at polluted site. At control it was highest in *Tectona grandis* (7.93) and lowest in *Eucalyptus* (7.66). Thus the present study reveals that *Shorea robusta* with highest APTI value has highest power to combat air pollution. It can thus be used in biomonitoring.

References

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Table 1-Average value of impact of roadside automobile emission on different plant parameters and air pollution tolerance index

Tree Species	Polluted						Control							
	Chlorophyll 'a', mg/g	Chlorophyll 'b', mg/g	Total Chlorophyll mg/g	Ascorbic Acidic mg/g	pH	Relative water content (%)	Air pollution Tolerance index (APTI)	Chlorophyll 'a', mg/g	Chlorophyll 'b', mg/g	Total Chlorophyll mg/g	Ascorbic Acidic mg/g	pH	Relative water content (%)	Air pollution Tolerance index (APTI)
Magnifera indica	5.50	4.50	10.01	1.88	5.93	63.73	9.58	6.53	2.06	8.60	2.01	6.08	52.33	9.01
Tectona grandis	1.72	0.63	2.35	1.28	5.64	62.58	9.29	2.74	0.74	3.49	2.76	6.37	63.32	7.93
Eucalyptus citrdora	1.91	0.58	2.49	1.95	6.27	55.05	7.19	1.66	0.55	2.21	1.44	6.31	64.25	7.66
Shorea robusta	3.40	1.66	5.06	2.00	6.39	87.33	11.27	2.35	1.09	3.23	1.50	6.44	64.60	7.92