

AIR POLLUTION TOLERANCE INDEX (APTI) OF SELECTED PLANTS AT SANTALDIH AREA UNDER PARA COMMUNITY DEVELOPMENT BLOCK, PURULIA DISTRICT, W.B. (INDIA)

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Abstract

Present study has been attempted to establish the effects of air pollutants on four dominant plant species i.e., Plant species *Mangifera indica* (Aam), *Tagetes erecta* (Marigold), *Ocimum sanctum* (Tulsi), and *Azadiracta indica* (Neem) growing at Santaldih area under Para community Development Block, Purulia district, West Bengal (India) encompassing Dharmasthan para, i.e., Commercial area), Korgali (Residential area), Nabagram (control area, which is situated far away from the industries) and Washery (very near to cement industry) in 2019-20. The impact of air pollutants on the biochemical characters of the selected plant species from industrial and urban areas was studied by calculating ascorbic acid, total chlorophyll, leaf extract pH and relative water content from leaf tissues. From calculated APTI, it may be concluded that here all species at all locations are belonging to “intermediate species” group.

Keywords: Air pollution, *Mangifera indica*, *Tagetes erecta*, *Ocimum sanctum*, *Azadiracta indica*, biochemical characteristics, APTI.

INTRODUCTION

In recent times pollution has become the prime menace for the survival of the biological species. There are various kinds of pollution e.g., air, water, soil, sound and mental pollution. Most of the countries including India, the environment has reached its carrying capacity in terms of air pollutants. In recent times, in almost all cities, medium and small towns in India; there has been significant development activity in terms of industrialization and urbanization. Plants provide an enormous leaf area for impingement, absorption and accumulation of air pollutants to reduce the pollutants level in the environment, with a various extent (Lui and Ding, 2008). Plants can be effectively used as bio indicators of air pollutants, although their sensitivities could vary across the plant community with tolerant species showing no or minimal symptoms while sensitive ones showing symptoms even if the air pollutants increase in small amounts (Singh, 2003). Singh and Verma (2007) reported that, plants sensitivity and tolerance to air pollutants varies with change in Leaf extract pH, Relative water contents (RWC), ascorbic acid (AA) content and Total Chlorophyll content.

MATERIALS AND METHODS

Santaldih area is located at [23.36°N 86.28°E](#). Leaves were collected in triplicate for analysis from

Dharmasthan para, *i.e.*, Commercial area), Korgali (Residential area), Nabagram (control area, which is situated far away from the industries) and Washery (very near to cement industry). Plant species *Mangifera indica* (Aam), *Tagetes erecta* (Marigold), *Ocimum sanctum* (Tulsi), and *Azadiracta indica* (Neem) were studied. Samples were collected in early morning and brought to laboratory in polythene bag kept in ice box to nullify the adverse effect of high light intensity and temperature. The collected leaf samples were analyzed for the following biochemical estimations namely pH of leaf extract (Singh and Rao, 1983), Total chlorophyll (Yoshida *et al.*, 1971), Ascorbic acid (Bajaj and Kaur, 1981) and Relative water content (Singh and Rao, 1983). The air pollution tolerance index (APTI) has been determined to find the tolerance levels of trees against the air pollutants. The APTI is calculated by the formula, $APTI = (A(T=P) + R) / 10$ (Singh and Rao, 1983) where, A= Ascorbic acid (mg/g), T=Total chlorophyll (mg/g), P = pH of leaf extract and R=Relative water content of leaf extract.

RESULTS AND DISCUSSION

Table.1: Status of biochemical parameters of *Mangifera indica*

Sampling sites	<i>Mangifera indica</i> (Aam)				
	pH	Chlorophyll (mg/g)	Ascorbic acid (mg/g)	Relative Water Content (%)	APTI
Dharmasthan para	6.22	2.43	6.73	83.64	14.19
Korgali	6.45	2.38	6.71	79.65	13.89
Nabagram	6.59	2.49	6.42	88.12	14.64
Washery	6.19	2.25	6.89	71.32	12.95

Table.2: Status of biochemical parameters of *Azadiracta indica*

Sampling sites	<i>Azadiracta indica</i> (Neem)				
	pH	Chlorophyll (mg/g)	Ascorbic acid (mg/g)	Relative Water Content (%)	APTI
Dharmasthan para	6.93	2.86	5.93	70.33	12.84
Korgali	6.87	4.16	6.87	79.54	12.81
Nabagram	6.96	3.90	5.76	72.36	13.49
Washery	6.31	3.91	6.04	68.57	13.03

Table.3: Status of biochemical parameters of *Tagetes erecta*

Sampling sites	<i>Tagetes erecta</i> (Marigold)				
	pH	Chlorophyll (mg/g)	Ascorbic acid (mg/g)	Relative Water Content (%)	APTI
Dharmasthan para	7.12	3.48	5.73	83.64	14.44
Korgali	5.47	2.31	6.73	72.65	12.50
Nabagram	7.59	4.39	5.48	88.12	15.38
Washery	5.38	2.08	6.80	73.32	12.40

Table.4: Status of biochemical parameters of *Ocimum sanctum*

Sampling sites	<i>Ocimum sanctum</i> (Tulsi)				
	pH	Chlorophyll (mg/g)	Ascorbic acid (mg/g)	Relative Water Content (%)	APTI
Dharmasthan para	6.93	2.17	4.93	73.36	11.82
Korgali	6.06	4.19	5.81	69.54	12.91

Nabagram	6.23	3.96	5.77	79.36	13.82
Washery	6.28	3.91	6.04	67.57	12.91

pH of *Mangifera indica* (Aam) ranges between 6.19 and 6.59. pH of *Azadiracta indica* (Neem) ranges between 6.31 and 6.96. The pH of *Tagetes erecta*, and *Ocimum sanctum* leaves ranges between 5.38 and 7.59; and 6.06 and 6.93 respectively. Chlorophyll contents of leaves gradually decreased in both species from control to more polluted zones; minimum of Aam at Washery (2.25 mg/l), maximum at Nabagram (2.49 mg/l); whereas range of chlorophyll of Neem recorded between 2.86 and 4.16 mg/l. Chlorophyll contents of *Tagetes erecta*, and *Ocimum sanctum* leaves ranges from 2.08-4.39, and 2.17-4.19 respectively. Total chlorophyll (TCH) is related to Ascorbic Acid productivity and Ascorbic acid is concentrated mainly in chloroplast. Ascorbic acid content of all species was higher at industrial areas, moderate at commercial, and low at control area. Relative Water Content of all species found maximum at control zone and minimum at industrial area. So, here all species at all locations are belonging to “intermediate species” group.

CONCLUSION

These specieses are in stress condition. These are acting as indicator species in this area. Pollution status should be checked. Tolerant species should be planted.

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