



## BIOMONITORING OF AIR POLLUTION AROUND URBAN AND INDUSTRIAL SITES OF WASHIM CITY, (MAHARASHTRA)

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### ABSTRACT

The present study reveals the biomonitoring of air pollution in relation to air pollution tolerance index (APTI) of Washim city of Maharashtra, during the year 2013-2014. Altogether 32 plant species were evaluated in the region and it was observed that 15 plant species were found to be sensitive, 08 plant species were intermediate and 09 plant species were found to be tolerant in this area and were act as an indicator of pollution in this area.

**KEY WORDS:** Air pollution, APTI, Indicators, Plant species.

### INTRODUCTION

Washim city, one of the District of Maharashtra having, 5178 sq kms. geographical area with MIDC situated just 5 kms away from the Washim city on Washim-Hingoli Highway and Purna-Akola Broad-gauge Railway. With the increasing human population, automobiles, industrialisation etc. has rapidly deteriorated the air quality by various air pollutants which are hazardous to plants (Agrawal *et al.*, 1989). Various plants and plant communities are very sensitive to these air pollutants. Therefore, such plants are called indicator plants. In other countries like America and Europe the Lichens and Mosses have been used as biomonitoring of air pollutant (De Sloover and Le Blanc, 1968). The use of higher plants in biomonitoring air quality is a new concept with various plant parameters adopted for evaluating the air pollution of the environment. Therefore, through these investigations an attempt has been made to evaluate air pollutants in the form of air pollution tolerance index (APTI) in Washim city.

### MATERIALS & METHODS

The survey of Washim city was conducted during the year 2013-2014 and about 32 plant species were collected (Table-1) from road side of State Highway also in and around the area. The leaves of these plant species were collected, brought to the laboratory and chemical analysis with the parameters such as total chlorophyll content (T), pH (P), relative water content of leaf tissue (R) and ascorbic acid level (A) was evaluated by 2-6 dichlorophenol indophenols method

Using Digital pH meter, spectrophotometer, the air pollution tolerance index (APTI) was calculated according to the formula given by Mashitha and Pise (2001).

$$APTI = [RA (T+P) 1/100]$$

The APTI were categorized into sensitive (01-16 APTI), intermediate (17-29 APTI) and tolerant species (30-100 APTI).

**TABLE 1:** Air pollution tolerance index (APTI) of some common plants around urban and industrial sites of Washim City

Sr.No.	Name of the Plant	Common name	APTI	Category
1	<i>Azadirachta indica juss</i>	K.adu Neem	178	Intermediate
2	<i>Acacia arabica Wild.</i>	Babool	11.3	Sensitive
3	<i>Albizia lebeck Benth.</i>	Sins	25.0	Intermediate
4	<i>Semicarpus anacardium L.</i>	Bhilawa	27.3	Intermediate
5	<i>Dalbergia Sissoo L.</i>	Shisham	62.5	Tolerent
6	<i>Vlangifera indica L.</i>	Aam	37.02	Tolerent
7	<i>Bauhinia Variegata L.</i>	Kanchan	108	Sensitive
8	<i>Aegle marmelos L. Corr.</i>	Bel	35.4	Tolerent
9	<i>Tamarindus indica L.</i>	Imli	22.0	Intermediate
10	<i>Cassia auriculata L.</i>	Amaltas	57.3	Tolerent
11	<i>Zizyphus marutiana L.</i>	Ber	21.4	Intermediate
12	<i>Polyalthia longifolia L.</i>	Ashoka	37.0	Tolerent
13	<i>Moringa oleifera Lam.</i>	Mungana	12.5	Sensitive
14	<i>Syzygium cumini L. Skeel.</i>	Jamun	34.01	Tolerent
15	<i>Annona squamosa L.</i>	Sitaphal	15.4	Sensitive
16	<i>Citrus lemon L.</i>	Neembu	42.6	Tolerent

,17	<i>Ficus religiosa L.</i>	Peepal	17.4	Intermediate
18	<i>Pongamia pinnata (Linn.) Merr.</i>	Karanj	38.3	Tolerant
19	<i>Emblica officinalis Gaerth.</i>	Awala	13.1	Sensitive
20	<i>Punica granatum L.</i>	Anar	04.3	Sensitive
21	<i>Ficus bengalensis L.</i>	Wad	14.0	Sensitive
22	<i>Butea monosperma (Lamk.) Kuntze.</i>	Palas	11.8	Sensitive
23	<i>Murraya koenigii L. Sprang.</i>	Mithaneem	12.2	Sensitive !
24	<i>Ricinus communis L.</i>	Yerand	13.1	Sensitive
25	<i>Terminallia bellirica Gaertn.</i>	Behada	22.5	Intermediate
26	<i>Bombax ceiba L.</i>	Kateshevar	26.4	Intermediate
27	<i>Pithecellobium dulce (Roxb.) Bth</i>	Jangal Jalebi	10.5	Sensitive
28	<i>Sapindus emarginatus. Vahl.</i>	5Utha	36.1	Tolerant
29	<i>Santalum album L.</i>	Chandan	14.0	Sensitive
30	<i>Eucalyptus globulus Labill.</i>	Nilgiri	12.3	Sensitive
31	<i>Ocimum sanctum L.</i>	Tulsi	06.1	Sensitive
32	<i>Vitex negundo L.</i>	Nirgudi	05.3	Sensitive

S=15, I = 08, T= 09

## RESULT & DISCUSSION

The APTI of 32 plant species was evaluated during the year 2008-2009 and observations are recorded in (Table -1). The APTI were categorized into 01-16 (sensitive), 17-29 APTI (Intermediate), 30 and above APTI (Tolerant species), Suggested by Dwivedi and Pandey (2006). All the plant species represents marked differences in air pollution tolerance index (APTI) the result reveals that out of 32 tested plant species 15 species were found to be sensitive for air pollution ranging between 4.3 (*Punica granatum L.*) to 15.4 (*Annona Squamosa L.*) 08 plant species were Intermediate with APTI between 17.8 (*Azadirachta indica juss.*) to 27.3 (*Semicarpous anacardium L.*). While 09 plants species were found to be tolerant and showed APTI between 35.4 (*Aegle marmelos L.*) to 62.5 (*Dalbergia Sisso L.*). This observation indicates that there is varied susceptibility among plants in Washim city. Among the tested plant species 46.87 % were sensitive, 25.0 % were Intermediate while 28.12 % were found tolerant to air pollution and indicates seriousness toward the loss of vegetations.

The APTI in industrial polluted area has been reported by Agarwal (1985) and Gerhold (1975). The usefulness of Floristic composition as an indicator of air pollution has been studied by Mass *et al.* (1987). Rayappa *et al.* (1993) reported that no any remarkable difference was noticed in between polluted and non polluted area Agrawal *et al.* (1991) and Dwivedi *et al.* (2006) reported some plant species were most sensitive and act as bioindicator species to air pollution. The tolerant plant species may be useful to grow in polluted area to reduce the environmental pollution to some extent. These plants can also be used as an indicator species of air pollution. Thus due to some indicator value of tolerant and sensitive species used as monitor of environment in the region.

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