



STUDY OF IMPACT OF AIR POLLUTION ON PLANTS BY ESTIMATION OF APTI OF CERTAIN TREES IN KATRAJ AREA IN PUNE CITY

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ABSTRACT

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Air pollution is one of major concerns in Pune City currently. Study highlights increase in Particulate matter from Vehicular sources & Urbanization in Karaj area is having harmful impact on the trees in the area.

Leaf of Plant species such as Peepal(Ficus religiosa), Tamarind(Tamarindusindica), Rain tree(Samaneasaman), Ashoka (Saracaasoca), Manago(Mangiferaindica), Almond(Terminaliacatappa) , Banyan tree(Ficusbenghalensis) were selected and it was found that Ashoka(Saracaasoca), Mango tree(Mangiferaindica) showed Intermediate APTI whereas Peepal, Tamarind, Rain tree, Almond, Banyan tree were found to be Sensitive to pollution.

KEYWORDS: *Air Pollutants, APTI of plants, Total Chlorophyll, Ascorbic acid, p H of leaf, Relative water Content (RWC)*

INTRODUCTION

Air Pollution is turned out to be major problem in Pune city. Increased air pollution is attributed to developmental activities, Urbanization & increased number of vehicles in Pune city. These air pollutants are having major impacts on the plants and trees. Plants susceptibility and tolerance towards air pollution can be determined by calculating APTI of plants using parameters like –Total Chlorophyll , Relative water content(RWC) , Ascorbic acid content and p H of plant.

MATERIALS AND METHODS

Study area

Katraj area was selected as study area which is located in Pune city. Located in 18 °27'13"N and 73°51'42"E. Leaf samples were collected from Katraj Bus stop and surrounding area , and APTI calculations were done. The plant species selected for the area are as follows- Almond (Terminaliacatappa) ,Ashoka (Saracaasoca), Mango (Mangiferaindica), Peepal(Ficus religiosa), Rain tree (Samaneasaman), Tamarind (Tamarindusindica), Banyan tree (Ficusbenghalensis).

Samples were collected in triplicates in month of January 2018.

1. Total Chlorophyll Estimation- was done by method of Arnon
2. Relative water content was determined by taking Initial and Final weight of plant sample by drying it in Hot air Oven
3. pH of plant sample was determined by using calibrated pH meter
4. Ascorbic acid content of plant sample was done using method of Sadasivam and Manikam

APTI (Air Pollution Tolerance Index) was calculated using formula -

$$\text{Air pollution tolerance Index of species} = [A(T+P)] + R / 10$$

Where

A= ascorbic acid content of leaf in mg/g dry weight
 T=total chlorophyll content of leaf in mg/g dry weight
 P= Leaf extract pH
 R= Relative water content(RWC)
 10= Total sum is divided by 10 to obtain APTI values

After calculations result was interpreted as- plants showing APTI between 30-100 were termed as Tolerant, APTI between - 29-17 were termed as Intermediate and plants having APTI between 16-1 were termed as Sensitive to Air Pollution.

RESULTS AND DISCUSSION

Table 1-Showing Air Pollution data for January 2019 - Data Source- IITM, Pashan

| Month | PM 10 (Particulate matter) µg/m ³ | PM 2.5 (Particulate matter) µg/m ³ | NO _x | SO _x |
|--------------|--|---|-----------------|-----------------|
| January 2018 | 297.5 | 144.3 | 38.2 | 35 |

It was found that PM 10 (Particulate matter) and PM 2.5 (Particulate matter) are major air pollutants in Katraj area beyond permissible limit. These pollutants are due to vehicles and Urbanization. These pollutants are having major impact on the plants in Katraj area.

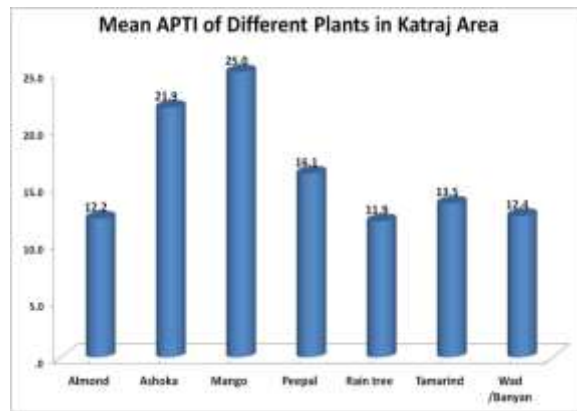
Changes in all 4 parameters were observed. High Relative Water content in plants is an indicator

that plants are tolerant to air pollution. High Total chlorophyll Content is an indicator that plants are not affected by air pollution. Plants having high Ascorbic acid content were found to be tolerant to air pollution. Plants showing pH below 7 are susceptible to air pollution and plants above 7 are tolerant towards air pollution.

Table -2

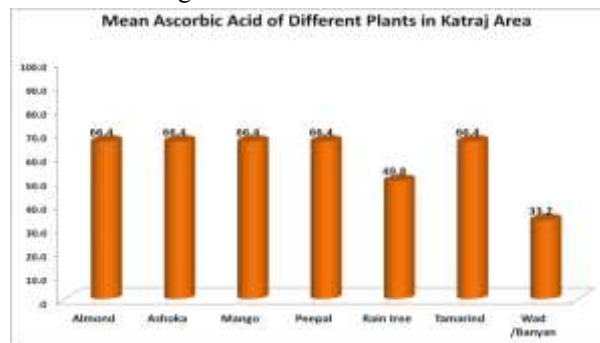
Results showing APTI (Air Pollution Tolerance Index) of Katraj area near Bus stop and surrounding area

| Parameters | Peepal | Tamarind | Rain tree | Ashoka | Mango | Almond | Banyan |
|------------------------|--------------------|--------------------|--------------------|-----------------------|-----------------------|--------------------|--------------------|
| pH | 2.3 | 2 | 2.3 | 3.1 | 3.6 | 1.9 | 3.6 |
| Relative water content | 0.066 | 0.078 | 0.112 | 0.094 | 0.142 | 0.024 | 0.085 |
| Total Chlorophyll | 0.025 | 0.029 | 0.0252 | 0.0261 | 0.024 | 0.029 | 0.028 |
| Ascorbic acid | 66.4 | 66.4 | 49.8 | 66.4 | 66.4 | 66.4 | 33.2 |
| APTI | 15.44 Sensitive | 13.48 Sensitive | 11.59 Sensitive | 21.43 Intermediate | 24.07 Intermediate | 12.81 Sensitive | 12.05 Sensitive |



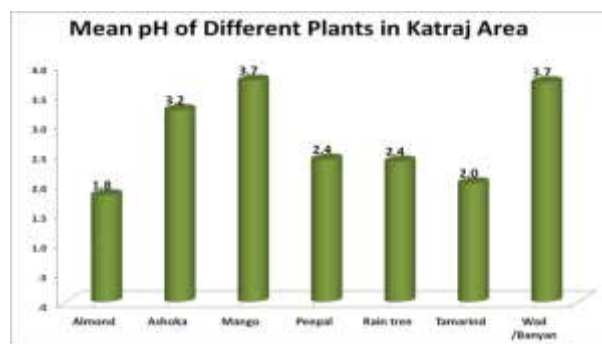
It is found that Mango tree showed highest APTI, followed by Ashoka tree, Peepal tree, Tamarind tree, Banyan tree and Rain tree. Highest

APTI shows tolerance towards air pollution and lowest APTI shows sensitivity towards air pollution.



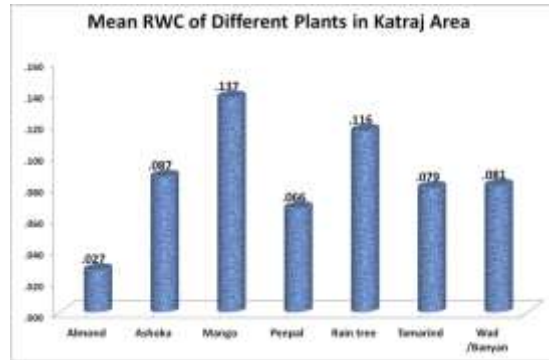
It was found that highest Ascorbic acid content was seen in Almond, Ashoka, Mango, Peepal,

Tamarind tree and lowest in Rain tree. More Ascorbic acid content more tolerant is plant to air pollution



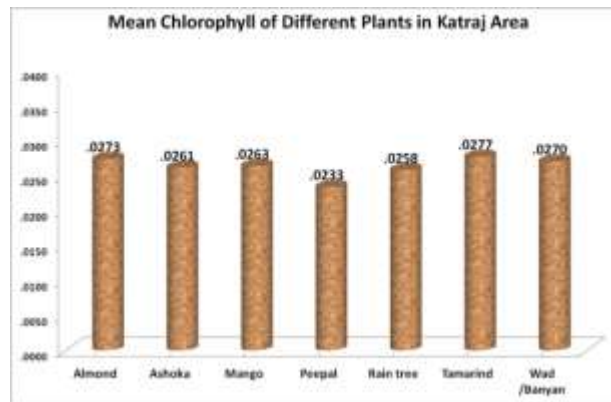
P H was found to be mostly acidic due to presence of air pollutants. Mango, Banyan tree showed p H towards acidic, lowest was seen in

Almond tree. Low p H levels indicate sensitivity and intolerance of plants towards air pollution.



Highest relative water content was seen in Mango tree and lowest in Almond tree. Low Relative

water content indicates that the plants are impacted because of pollution.



It was found that all plants showed low chlorophyll content because of impact of pollution on plants . Lohegaon area was selected for the study. Samples were collected from Airport to find out impact of air pollution on plants in Lohegaon area .

effect of Air Pollution. Particulate matter in Karaj area can be reduced by vehicle maintenance, use of eco-friendly fuel and Plantation of trees.

RESULTS & DISCUSSION

Ascorbic acid Content was found to be highest in Almond, Ashoka, Mango, Peepal, Tamarind trees, followed by Rain tree and lowest in Banyan tree. p H was found to be lowest in all the plants showing impact of pollution on them. Almond tree showed lowest p H. Relative Water Content (RWC) was found to be Highest in Mango tree and Rain tree . Lowest Relative water content (RWC) was observed in Almond tree. Chlorophyll content was found to be nearly same in all plants.

APTI showed that onlyAshoka and Mango tree are Intermediate to pollution whereas Peepal, Tamarind, Rain tree and Banyan tree are sensitive to Air pollutant.

CONCLUSION

APTI (Air Pollution Tolerance Index of plants can be used as indicator of plants that can be used to control air pollution in Katraj area. It can be concluded that Asoka and Mango tree can be planted to reduce the

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