An Analysis on The Susceptibility Level of Plants to Air Pollutants Through Significance of The Air Pollution Tolerance Index

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***Abstract* - Recent decades have seen an increase in air pollution as a result of increased manufacturing and urbanisation. Particulate matter poses a serious threat to human health and the environment. Plants' general physiology may be severely harmed by both particle and gaseous contaminants. Because of their enduring nature, trees are subject to the most pollution and have the biggest impact. Air pollution has become a serious issue throughout the globe in the contemporary world due to car emissions, fast industrialisation, agricultural practises, and other factors. Pollutants in the air may be controlled by plants, since they can withstand them. A considerable number of thermal power plants are being built by the public and private sectors in order to fulfil the rising demand for energy from industry, agriculture, and home requirements. The pollutants emitted by these power plants are quite diverse. Eleven commonly cultivated plant species near the Neyveli Lignite Corporation Limited (NLC) region were studied for their Air Pollution Tolerance Index significance as a means of determining the sensitivity level of plants to air pollution.**

***Index Terms* - Air Pollution Tolerance Index, Air Pollutants, Plant Species, Neyveli Lignite Corporation Limited, etc.**

I.INTRODUCTION

Air pollution is a regional and worldwide issue that has a negative impact on people's health and well-being by increasing their susceptibility to illness. City emissions are responsible for 71% of global greenhouse gas emissions, and automobile emissions are a key source because of the growing dependence on private mobility. The primary source of urban air pollution, which harms both the environment and human health with toxic pollutants, is vehicular traffic. When it comes to removing HF, SO2, Cl 2, NO2, O3, and PAN (Peroxyacetyl Nitrate) from the atmosphere during the growing season, vegetation is always regarded to be a sign of an efficient sink.

Plant biochemical characteristics may be used as bio-monitoring of air pollution and its effects. One of the best indicators of plant susceptibility to air pollution (APTI) is leaf pH, water content, chlorophyll and ascorbic acid, since these factors affect plant sensitivity and tolerance to air pollution. When these variables are combined, the findings are more accurate than if they were taken individually. It may seem simple to plant trees along the roadside, but it is important to evaluate all the aspects that may impact a tree species in order to ensure its long-term viability. Whether it's via the leaves or the soil, air pollution may have an impact on plants in one of two ways. A plant's carbon allocation pattern and the lifetime of its leaves may all be affected by air pollution, as can the permeability of its leaves, resulting in leaves losing their capacity to photosynthesize sooner (due to loss of water and dissolved nutrients). They are considerably more vulnerable since they are in close touch with contaminants that ultimately injure them and make it harder for them to live their lives. Green belts and air quality can be improved by planting trees that can withstand pollution, and this may be done by assessing the plant's tolerance level to pollution.

Anticipated Performance Index (API)

Anticipated Performance Index (API) For example, it is beneficial in selecting plants that may improve air quality while still offering aesthetic or recreational value for people to enjoy. Using this calculation, you may determine your API.

$$API = \frac{No.of\ `+'\ obtained}{Total\ No.of\ `+'} \times 100$$

Air Pollution Tolerance Index (APTI) The Singh and Rao approach was used to assess a plant species' air pollution tolerance index (1983). "Two leaf characteristics are used to create an empirical no. showing the APTI in order to determine the sensitivity of plant species to air pollution.''

$$APTI = \frac{[A(T + P) + R]}{10}$$

Whereas, R = relative water content in mg/ g, A = ascorbic acid in mg / g,T = total chlorophyll in mg/ g, P = pH of plant leaf.

II. REVIEW OF LITERATURE

Prabhat Kumar Rai, Lalita L. S. Panda, Biku Moni Chutia and M. Muni Singh (2013) In this research, six common roadside plant species in India's industrial (Rourkela) and non-industrial (Aizawl) areas were used to determine APTIs (air pollution tolerance indices). Ascorbic acid concentration, total leaf chlorophyll, and leaf extract pH were all taken into account while calculating the APTI, which is a combination of these four physiological and biochemical variables. It was decided to conduct the research on the following plant species: Ficus bengalensis, Mangifera indica, Bougainvillea spectabilis, P. sidoides, Hibiscus rosa-sinensis, Lantana camara, Hibiscus roseum, and Lantana camara. The leaf samples of all the selected plants collected from the industrial site (Rourkela) were lower in total chlorophyll content and pH than samples from the non-industrial site (Aizawl), but the concentrations of APTI, ascorbic acid, and RWC were higher in the industrial site (Rourkela) samples than in the non-industrial site samples (Aizawl). Ferruginea and M. indica were found to have tolerance levels of 8.64 and 7.95, respectively, according to the APTI test at the industrial site (Rourkela) and the non-industrial site (Aizawl). Plants such as M. indica and B. spectabilis, which exhibit the smallest differences in their APTI values, might be regarded to be tolerant of both industrial and non-industrial environments.

Dileswar Nayak, D.P. Patel, H.S. Thakare, K. Satasiya and P.K. Shrivastava (2015) Air pollution tolerance index (APTI) was evaluated for five different plant species near the industrial region and Navsari Agricultural University campus in the current research. – Ascorbic acid concentration, chlorophyll content, and leaf pH were tilized to calculate the APTI values from four physiological and biochemical variables. According to the research, Cassia fistula had the highest APTI score of all industrial species tested. Saraca asoca, Syzygium cumini, and Cassia fistula were found to be tolerant of the industrial area's APTI value. Terminalia catappa and Tectona grandis have been discovered to be more sensitive to the contaminated location. As a result, it is advised that industrial sites plant Saraca asoca, Syzygium cumini, and Cassia fistula trees. Using a performance measure, the researchers believe that species that are likely to perform well in the creation of green ecosystems may be selected.

Kiran Kanwar, Man K. Dhamala and Rejina Maskey-Byanju (2016) Particulate matter created by traffic may be reduced by planting trees and shrubs on the roadside. Cities' green belts, which have high APTIs, can improve air quality by filtering out harmful pollutants. Ascorbic acid, total chlorophyll, and relative water content were measured in APTI samples from the trees that were found to be most abundant.. From 5.56 (Punica granatum) to 79.99, tree species had APTI values that varied widely (Populous deltoids). Those with a higher APTI score are more tolerant to air pollution. Pinus roxburghi, Ficus tilized, Celtis australis, Alnus nepalensis, Callistemon lanceolatus and Schima wallichi were discovered to be the most sensitive tree species whereas Prunus persisa and Thuja sp. Were found to be the most tolerant of the other tree species. Improved air pollution sinks and refinement are achieved by more tolerant to moderately tolerant tree species in green belts. The valley planting programme should prioritise those plants with a higher APTI value in order to locate those with excellent APTI values in future investigations.

Sen et al. (2017) Scientists looked at how various plants' pH levels changed before and after the monsoon season and discovered that plants' pH levels were acidic at this time owing to higher levels of air pollution. Post-monsoon rains washed away air pollutants, which resulted in a rise in plant pH. ''When the pH is too low, gases can't be exchanged between leaves and stomata and the photosynthetic rate of plants is hampered." When the pH is too high, plants are better able to tolerate air pollution. The physiological activity of plants may be controlled by pH, according to research. The activity of several enzymes is dependent on the pH of the organism.

When the pH drops, the photosynthetic efficiency suffers as a result. At a neutral pH, the plant is immune to air contaminants, but at a low pH, it is sensitive.

Nayak, Anjali, Madan, Sangeeta, and Matta, Gagan (2018) Plant species in Uttarakhand's Haridwar region were assessed using the Air Pollution Tolerance Index (APTI) and the Anticipated Performance Index (API). The API takes into account not just APTI, but also the species' biology and socioeconomic status. In Azadirachta indica, the maximum APTI was found at site-1, whereas the lowest APTI was found at site-3. Azadirachta indica had the greatest API percent score of 54 percent, while Nerium indicum had the lowest API percent score of 77 percent in this research. To reduce urban air pollution and create green belts, this research found that evaluations of the above mentioned index with a high APTI are important.

Sethi & Mittal (2019) According to the AQI, the air quality in the Faridabad area ranged from moderately dirty to extremely poor. The air quality of Faridabad's residential, commercial, and industrial districts was analysed by Sharma et al. (2019) and found to be moderate to highly polluted.

Sameh A Amin et al (2021) An assessment of the pollution-resistance potential of tree species in Jubail Industrial City was conducted. The ascorbic acid, chlorophyll, pH, and relative water content of the study species' leaves were used to calculate their Air Pollution Tolerance Index (APTI). The findings showed that contaminants have a significant effect on APTI and that APTI is positively correlated with both pH and relative water content. If the APTI does not exceed (9) then it is safe to assume that all the study species are sensitive, although they all have different sensitivities. Ficus altissima had the highest APTI (8.803) value, making it the most suitable species for planting in Jubail City's industrial zone since it is the least sensitive (or least tolerant) of the species evaluated. However, all the species studied in the region are excellent bioindicators of pollution. Planting more tolerant tree species that may be tilized as bio monitors for environmental toxins in Jubail Industrial City should be a key part of urban green design in the area.

Priya Choudhary, Shakeel Ahmad Khan, Ambrina Sardar Khan, Sandeep Kumar, Lal Chand Malav (2021) Rice and wheat were tested to see how well they tolerated the air pollution from the nearby gas-fired power station. A 10-kilometer radius surrounding a gas-based power plant was used to determine ten potential locations. During the development of rice and wheat, Nox, Sox, ozone, and PM10 were measured at ten locations. Villages have an Air Quality Index (AQI) that falls into the moderately polluted category. In order to classify plants according to their sensitivity or tolerance to air pollution, the Air Pollution Tolerance Index (APTI) uses four biochemical characteristics, including rice and wheat relative water content (relative water content), ascorbic acid (ascorbic acid), and pH (potassium). The cell sap pH of both crops was found to be acidic to neutral (3.5-6.9) in very polluted areas, but neutral to slightly alkaline (7.0-7.9) in less contaminated areas. In contaminated areas, ascorbic acid concentrations were high because ascorbic acid has been shown to have a protective effect against air pollution. "Most contaminated locations have shown a considerable drop in chlorophyll concentration (up to 0.61mg/g) and relative water content.'' Both crops were shown to be vulnerable to air pollution in the study region based on APTI values (APTI11). Polluted areas may benefit from using APTI to choose crop species that can withstand high levels of air pollution. Acidic pH, total chlorophyll content, and relative water content were shown to be favourably connected with APTI, whereas ascorbic acid was found to be adversely associated.

Enitan et al (2022) Air pollution tolerance index (APTI) and expected performance index (API) were used in this study to assess indigenous plants for air pollution reduction by comparing tolerance level and performance indexes. Indigenous plants tested had APTIs ranging from 4.79 (Syzygium malaccense) to 31.75 (Psidium guajava). One of the chosen plants is immune to air pollution, whereas the other seven (7) have APTIs that range from moderate to high: Swietenia mahogany (28.08) > Mangifera indica L. (28.07) > Ficus infectoria L. (23.93) > Ficus religiosa L. (21.62) > Zizyphus Oenoplia Mill (20.06) > Azadirachta indica A. Juss. (19.01) > Ficus benghalensis L. (18.65). For air pollution remediation, the API value showed that Mangifera indica L., Ficus religiosa L, and Azadirachta indica A. Juss. Were excellent to middling performers, while Cassia fistula L. was poor to extremely poor. An rise in APTI is associated with an increase in API (R2 = 0.63), which suggests that the two variables are linked in a favourable manner. For long-term air pollution control and green ecomanagement, this research reveals that

Mangifera indica L., Ficus religiosa L, and Azadirachta indica A. Juss. Have high potential.

III. OBJECTIVE OF THE STUDY

The main goal of the research was to determine the susceptibility level of plants to air pollutants. Ten parameters were determined and computed together in a formulation signifying the Air Pollution Tolerance Index (APTI) of Eleven commonly grown plant species around the Neyveli Lignite Corporation Limited (NLC) area, including leaf extract pH, Relative Water Content, Ascorbic acid, Chlorophyll, protein, amino acid, reducing sugar, starch, and phenol.

IV. RESEARCH METHODOLOGY

It was decided to choose plants based on their appearance and where they were found in the local area around the station. This is an experimental location (ES). The different plants' leaves were then gathered and analysed. Immediately after harvesting three completely grown leaves, they were brought to the laboratory for testing. Prior to analysis, a mixed sample of each plant species was collected. The control location was chosen because it had comparable ecological parameters to the study site (CS). Refrigerated samples were kept for additional examination. An Indian township in the state of Tamil Nadu, Neyveli is primarily a mining and power generating township. Located in the Neyveli area, Neyveli Lignite Corporation Limited (NLC) is a government-owned Mini-ratna company incorporated under the Indian Companies Act 1956 to utilise the lignite resource. At twenty-four million tonnes per year, it has three lignite mines, which provide lignite to three thermal power plants with combined capacity of 2490 Mw, and it is an integrated complex. The sector is releasing a lot of pollutants into the air, land, and water, causing harm to the environment. During the course of three months, we performed the current research.

Parameters Studied

Leaf extracts pH and Ascorbic acid: Leaf Extracts pH was estimated by Singh and Rao, 1983.Ascorbic Acid (AA) Content was analyzed.

APTI (Air Pollution Tolerance Index) Determination: An attempt has been made to determine the Air pollution Tolerance Index (APTI) which gives an empirical value for tolerance level of plants to air pollution. This was done by following the method of Singh and Rao (1983). The formula for APTI is,

$$APTI = A\,(T + P) + R$$

A-Ascorbic acid
T-Total chlorophyll
P-Leaf extracts PH
R-Relative Water Content of the leave’s

Biochemical Analysis: Arnon, 1949, calculated the Chlorophyll concentration. Kirk and Allen, 1965, calculated the carotene content of a sample. Nelson, in 1944, made an estimation of the Reducing Sugars. Nelson, 1944, calculated the total sugars and non-reducing sugars. Following Moore and Stein's approach from 1948, we were able to determine the amount of amino acids present. Bray and Thorpe (1954) assessed the phenol concentration.

Relative Water Content (RWC): According to the method described by Liu and Ding (2008) relative leaf water content was determined and calculated with the formula.

$$RWC = (FW - DW)\,x\,10$$

TW-DW
TW=Turgid weight.
FW = Fresh weight
DW = Dry weight

V. ANALYSIS AND INTERPRETATIONS

The present study deals with the Air Pollution Tolerance Index of certain plants around the Neyveli Lignite Corporation Ltd (NLC), Neyveli.

Table 1: Effect of Air pollution on Leaf extracts P^H (mg/g fr.wt) and Relative water content of certain Plants around Neyveli town

Plants Name	Relative water content		Leaf extract P^H	
	Experimental Site	Control site	Experimental Site	Control site
Eucalyptus Sp. (L.) Her.	95.9 ±0.08	94.5 ±0.05	8.32 ±0.080	8.21 ±0.078
Lawsonia inermis L.	55.6 ±0.09	54.7 ±0.07	6.70 ±0.069	6.43 ±0.063
Lantana camera L.	40.3 ±0.09	38.5 ±0.08	4.69 ±0.058	4.63 ±0.060
Morinda tinctoria Ham.	76.8 ±0.09	76.0 ±0.05	7.86 ±0.071	7.34 ±0.067

Crotolaria labumifolia L.	49.9 ±0.13	46.5 ±0.06	5.70 ±0.051	5.34 ±0.049
Madhuca indica Gmelin	79.6 ±0.12	78.6 ±0.09	6.10 ±0.060	5.92 ±0.058
Phyllanthus emblica L.	71.9 ±0.17	70.9 ±0.09	6.90 ±0.043	6.74 ±0.045
Citrus medica L.	79.9 ±0.12	79.6 ±0.08	4.80 ±0.024	4.21 ±0.026
Sesbania sesban (L.) Merr	83.6 ±0.09	80.4 ±0.04	8.29 ±0.068	8.21 ±0.065
Citus limon L.	79.4 ±0.09	78.4 ±0.06	4.99 ±0.032	4.95 ±0.030
Murrya koenigii	36.9 ±0.07	36.7 ±0.05	3.98 ±0.032	3.87 ±0.028

Table 1 the pH of leaf extract and the relative water content of plants from the control and the experimental sites Eucalyptus sp. plants were found to have greater leaf extract pH in the experimental and control sites (8.32 0.080 mg/g fr.wt and 8.21 0.078 mg/g fr.wt, respectively). For Murrya koenigii, the lowest leaf extract pH (3.98 0.032 mg/g fr.wt) was reported in the experimental and control sites (3.87 – 0.028%). Eucalyptus sp. plants in the experimental and control sites had increased relative water content (95.9 0.08 mg/g fr.wt and 94.5 0.05 mg/g fr.wt, respectively). Murrya koenigii plants, on the other hand, showed a reduced relative water content in the experimental location (36.9 0.07 mg/g fr.wt) and control site (36.07 0.05 mg/g fr.wt).

Table 2: Effect of Air pollution on Ascorbic acid and APTI (mg/g fr.wt) content of certain plants Around Neyveli town

Plants Name	APTI		Ascorbic acid	
	Experimental Site	Control site	Experimental Site	Control site
Eucalyptus Sp. (L.) Her.	18.9 ±0.59	18.0 ±0.56	23.9 ±1.99	23.5 ±1.89
Lawsonia inermis L.	11.81 ±0.29	11.1 ±0.19	17.9 ±0.17	16.8 ±0.09
Lantana camera L.	7.92 ±0.32	7.6 ±0.24	4.09 ±0.18	4.02 ±0.14
Morinda tinctoria Ham.	11.4 ±0.32	10.2 ±0.27	12.9 ±0.19	12.7 ±0.15
Crotolaria labumifolia L.	7.99 ±0.18	7.85 ±0.12	5.99 ±0.09	5.78 ±0.03
Madhuca indica Gmelin	10.9 ±0.29	10.4 ±0.26	12.3 ±0.17	11.8 ±0.09
Phyllanthus emblica L.	9.12 ±0.40	8.69 ±0.39	15.7 ±0.19	14.7 ±0.15
Citrus medica L.	10.2 ±0.20	9.86 ±0.13	13.92 ±0.18	13.7 ±0.13
Sesbania sesban (L.) Merr	12.70 ±0.80	12.0 ±0.79	10.89 ±1.83	10.72 ±1.20
Citus limon L.	12.9 ±0.11	12.1 ±0.08	15.4 ±0.25	14.9 ±0.17
Murrya koenigii	7.89 ±0.20	7.5 ±0.16	4.09 ±0.12	3.07 ±0.07

Table 2 the Ascorbic acid and APTI content of the control and contaminated site plants, respectively. Ascorbic acid and APTI concentrations were found to be greater in Eucalyptus sp. plants from the experimental and control sites (23.9 1.99 and 18.9 0.59 mg/g fr.wt, respectively).

Table 3: Effect of Air pollution on Chlorophyll content (mg/g fr.wt) of certain plants around Neyveli town

Plants Name	APTI	
	Experimental Site	Control site
Eucalyptus Sp. (L.) Her.	14.96 ±0.005	14.90±0.004
Lawsonia inermis L.	11.61 ±0.021	11.58±0.017
Lantana camera L.	16.58 ±0.044	16.49 ±0.039
Morinda tinctoria Ham.	11.72 ±0.060	11.70 ±0.057
Crotolaria labumifolia L.	6.96 ±0.010	6.83±0.009
Madhuca indica Gmelin	12.54 ±0.035	12.53±0.030
Phyllanthus emblica L.	11.50 ±0.010	11.49±0.009
Citrus medica L.	11.69 ±0.015	11.56±0.012
Sesbania sesban (L.) Merr	12.0 ±0.017	11.97±0.015
Citus limon L.	10.21 ±0.024	10.16±0.021
Murrya koenigii	6.92 ±0.034	6.40±0.028

Table 3 indicates the total chlorophyll content of plants at both the polluted and the control sites. Eucalyptus sp. plants had the highest levels of total chlorophyll in both the experimental and control sites (14.96 0.005 mg/g fr.wt and 14.90 0.004 mg/g fr.wt, respectively). Similar results were seen in Murrya koenigii plants, which had reduced chlorophyll content in the experimental and control sites.

Table 4: Effect of Air pollution on Protein and Amino acid (mg/g fr.wt) content of certain plants

Plants Name	Amino acid		Protein	
	Experimental Site	Control site	Experimental Site	Control site
Eucalyptus Sp. (L.) Her.	10.99 ±0.070	10.89±0.06	33.71 ±0.093	33.68±0.089
Lawsonia inermis L.	4.99 ±0.047	4.92±0.03	12.42 ±0.021	12.59±0.018

Lantana camera L.	8.01 ±0.064	8.00±0.06	20.48 ±0.061	20.20±0.052
Morinda tinctoria Ham.	8.68 ±0.090	8.61±0.087	22.81 ±0.099	22.78±0.080
Crotolaria labumifolia L.	5.69 ±0.051	5.60±0.04	17.89 ±0.015	17.43±0.010
Madhuca indica Gmelin	4.98 ±0.074	4.59±0.06	18.20 ±0.142	18.00±0.137
Phyllanthus emblica L.	10.86 ±0.040	10.79±0.04	23.20 ±0.028	23.11±0.019
Citrus medica L.	6.86±0.052	6.75±0.04	14.62 ±0.099	14.61±0.078
Sesbania sesban (L.) Merr	5.17 ±0.007	5.14 ±0.007	19.28 ±0.445	19.24±0.347
Citus limon L.	4.82 ±0.005	4.76±0.004	14.7 ±0.043	14.65±0.032
Murrya koenigii	4.80 ±0.056	4.09±0.04	10.80 ±0.031	10.01±0.021

Table 4 protein and amino acid composition of the plants in the control and polluted sites. For Eucalyptus sp. plants, the greater protein and amino acid content was found in the experimental and control sites (33.71 0.93; 10.99 0.070 mg/g fr.wt), respectively. Same with Murrya koenigii plants, which had lower protein and amino acid content in the experimental and control sites (10.80 0.031/4.08-0.056 mmol/g fwt, respectively) than in the control site (10.01-0.0021; 4.09-0.040 mmol/g fwt).

Table 5: Effect of Air pollution on sugar content of certain (mg/g fr.wt) plants around Neyveli town

Plants Name	Total sugar		Reducing sugar	
	Experimental Site	Control site	Experimental Site	Control site
Eucalyptus Sp. (L.) Her.	18.69±0.070	18.62 ±0.062	14.90±0.034	14.87 ±0.029
Lawsonia inermis L.	13.84±0.026	13.79 ±0.020	8.69±0.010	8.51 ±0.009
Lantana camera L.	9.07±0.041	9.01 ±0.032	5.06±0.048	5.01 ±0.042
Morinda tinctoria Ham.	7.64±0.099	7.57 ±0.082	5.28±0.021	5.10 ±0.017
Crotolaria labumifolia L.	9.68±0.023	9.62 ±0.018	6.29±0.011	6.10 ±0.009
Madhuca indica Gmelin	15.38±0.062	15.30 ±0.062	11.82±0.027	11.73 ±0.024
Phyllanthus emblica L.	18.00±0.011	17.92 ±0.09	11.09±0.004	11.01±0.003
Citrus medica L.	17.46±0.040	17.42 ±0.032	11.24±0.019	11.19 ±0.012
Sesbania sesban (L.) Merr	14.27±0.016	14.20 ±0.012	12.00±0.005	11.0 ±0.005
Citus limon L.	14.24±0.024	14.13 ±0.020	11.99±0.011	11.84 ±0.010
Murrya koenigii	8.98±0.041	8.80 ±0.038	4.68±0.021	4.55 ±0.020

Table 5 Experiment and control plant sugar levels are shown by this graph. For Eucalyptus species, the sugar content was 14.90 0.034 mg/g fresh weight, whereas for control plants it was 14.87 0.029 and 18.62 0.062 mg/g fresh weight, respectively. Similar results were found for the decreased sugar content of Murrya koenigii plants, which were found in both the experimental (4.68 0.021; 8.98 0.041 mg/g fr.wt) and control (4.55 0.020) locations.

Table 6: Effect of Air pollution on Starch and Phenol content (mg/g fr.wt) of certain plants around Neyveli town

Plants Name	Phenol		Starch	
	Experimental Site	Control site	Experimental Site	Control site
Eucalyptus Sp. (L.) Her.	1.716 ±0.035	1.703 ±0.029	13.20 ±0.041	13.13 ±0.038
Lawsonia inermis L.	0.314 ±0.015	0.309 ±0.012	7.14 ±0.042	7.12 ±0.032
Lantana camera L.	0.611 ±0.030	0.598 ±0.023	9.94 ±0.012	9.68 ±0.016
Morinda tinctoria Ham.	0.712 ±0.035	0.701 ±0.029	13.14 ±0.049	11.14 ±0.032
Crotolaria labumifolia L.	0.329 ±0.001	0.320 ±0.004	7.86 ±0.006	7.79 ±0,004

Madhuca indica Gmelin	0.914 ±0.045	0.934 ±0.043	8.14 ±0.020	8.10 ±0.010
Phyllanthus emblica L.	0.211 ±0.010	0.198 ±0.011	9.84 ±0.006	9.46 ±0.004
Citrus medica L.	0.421 ±0.021	0.419 ±0.019	5.69 ±0.045	5.73 ±0.036
Sesbania sesban (L.) Merr	0.211 ±0.010	0.190 ±0.0110	11.12 ±0.022	11.10 ±0.017
Citus limon L.	0.431 ±0.021	0.418 ±0.018	9.89 ±0.007	9.36 ±0.006
Murrya koenigii	0.166 ±0.033	0.156±0.023	5.05 ±0.034	5.00 ±0.032

Table 6 Experimental and control plants are represented by a starch and phenol content index. It was found that Eucalyptus sp. plants had greater starch and phenol content in the experimental and control sites (13.20 0.041; 1.716 mg/g fr.wt) than the control site (13.13 0.038; 1.703). Similar to the decreased starch and phenol content in the experimental and control sites, Murrya koenigii plants were found to have lower levels of starch and phenol.

VI. CONCLUSION

Exposure to the environment means that plants are continually exposed to contaminants that impinge on their foliar surfaces. Due on their degree of sensitivity, they will display either noticeable or subtle changes. A plant's capacity to fight air pollution is indicated by its air pollution tolerance index. "plants with higher index values may be utilised as sinks to reduce pollutants, whereas plants with lower values show less tolerance." This can be used to indicate the degree of pollution in the air, as well. Increased respiration and lower CO2 fixation may be related to chlorophyll degradation, which reduces starch concentration in contaminated sites. The depletion of soluble sugars in the leaves of plants cultivated in polluted areas may be exacerbated under hardening circumstances by pollutants such SO2, NO2, and H2S. Sulfite's interaction with carbohydrates' aldehydes and ketones may also reduce the carbohydrate content of a food. There was either a substantial difference or a larger buildup of starch in contaminated areas in several plants. The problem of deforestation caused by air pollution has grown in recent centuries owing to increased industrialisation. APTI determination of plants is thus critical. Bio monitors for pollution stress include Eucalyptus species, Lawsonia inermis, Citus limon, Sesbania sesban, and Morinda tinctoria. The region's economy suffers greatly as a result of urbanisation and industrialisation. As a result, farmers in industrialised metropolitan and peri-urban regions may be advised to grow crops that have a high tolerance to air pollution, such as corn, wheat, and soybeans.

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