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# Biological analysis of roadside plant (*Mangifera indica* L.) exposed to vehicular pollution in Gangeo block, Rewa district (M.P.)

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**Abstract**
An overview of the morphological changes occurring in plants is provided by this study. Due to air pollution from the roadsides. Man's numerous activities alter the environment's complexity and composition. Transportation, building, population growth, and industrialization are some of these activities. Automobiles are a major source of air pollution in the Gangeo block. The environment is severely harmed by the emissions from vehicles. Studying vehicle pollution in industrial areas is aided by crucial metrics such as pH, chlorophyll, biomass, and leaf area.

**Keywords:** Vehicular pollution, chlorophyll, Biomass, species *Mangifera indica* L.

## Introduction
Unwanted changes to the quality of our environment (land, water, and air) that can have a negative impact on human life, property, trade and commerce, industries, and the life of desired plant and animal species are known as pollution. The maximum input needed is 11K liters of air, compared to 03L of water and 01Kg of food. Over the past few decades, industrialization and urbanization have been the primary causes of air pollution, which has grown to be a serious issue. Given its detrimental effects on plants and human health, particulate matter is a major concern (Rai, 2013) [8]. Worldwide, it has been shown that air pollution has a negative impact on ecosystems and biota. The effects of air pollutants on crops and vegetation at many levels, from biochemical to ecological levels, have been extensively studied experimentally (Khan *et al.* 1990 and Tiwari *et al.* 2006) [3, 4]. In both wealthy and developing nations, urban air pollution is a major issue (Li, 2003) [4]. Plants may be directly impacted by air pollution through their leaves or indirectly by soil acidity. The majority of plants that were exposed to airborne contaminants first underwent physiological alterations before showing obvious leaf damage (Liu and Ding, 2008) [5]. Continuous exposure to the environment has a significant impact on plants. One of the most pressing and significant environmental issues in India's road side village is vehicular pollution. Air pollution is a worldwide issue that increases as society advances.

## Materials and Methods
The leaves were collected in the month of June-July 2023 from the roadside trees of Gangeo block which is a block office, school and college side area and highly loaded by heavy traffic. This area is noted as more polluted area in our study. Another sample of leaves were collected from less polluted area is Shriyut P.G. College Campus Gangeo. It is a covered area and noted as less polluted area. The study was carried out during year 2023. Leaf samples of shrubs like *Mangifera indica* L. plant species grown road side. Polluted site and non-polluted i.e., Botanical garden college campus as control site. Leaves were collected from iso-ecological conditions (light, water and soil) About 30 leaf samples were taken from each individual of a species plants. The leaf sample observed with the help of hand lens for studied visible injury necrosis, chlorosis, flecks, stipples, bronzing etc. Leaf lengths (cm), breadth (cm), area ($cm^2$) were determined by using leaf area meter (CI-202, USA) and graph paper method.

## Results and Discussion

The extensive air pollution in the Gangeo block may be the cause of all the parameters that were examined in all the plant species of *Mangifera indica* L. at the more polluted site roadside compared to the less polluted site botanical garden. Numerous other researchers have also observed similar findings, including Silva *et al*. (2005) [12], Rao (2006) [9] and Stevovic *et al*. (2010) [13]. It is widely acknowledged that air pollution has a negative impact on the growth and physical characteristics of plants. Chlorosis, browning, yellowing, spotting, or change in the typical pigment and shape of the leaf are examples of colour changes. Work on vegetation impacted by air pollution, visible damage, and leaf shape, among other topics, has been conducted both domestically and abroad by Naveed *et al*. (2010) [6], Seyyed and Koochak (2011) [11] and Bhandarkar (2013) [1].

Few studies have been conducted in India by Tiwari *et al*. (2006) [14], Saquib *et al*. (2010) [10] and Giri *et al*. (2013) [2]. The influence of vehicle pollution was demonstrated by the research of dominant roadside plants. The findings in data table No. 01 demonstrated that several physiological alterations were noted, particularly with regard to the photosynthetic pigment chlorophyll, which is found in leaves. The leaves of the *Delbergia sisoo* and *Bouganvillia spectabilis* plants showed a decrease in chlorophyll content at the more polluted site. This was likely caused by the air's release of $SO_2$ and $NO_2$. According to Pathak *et al*. (2015) [7], these gases are deposited on the leaves, causing changes in the pH of the leaf wash and the pH of the leaf cell sap.

While the concentration of chlorophyll "b" pigment recorded in leaves of less polluted sites is 2.94 mg/g and in more polluted sites is 2.04 mg/g, indicating a 30.63% reduction, the concentration of chlorophyll "a" pigment recorded in leaves of *Mangifera indica* L. less polluted site is 3.32 mg/g and recorded in more polluted site is 2.87 mg/g, indicating a 16.06% reduction. A similar pattern was seen in the total chlorophyll concentration, with low concentrations in more contaminated areas and high values in less polluted areas (Table 1). According to the experimental results, automobile pollution is the cause of the decrease in chlorophyll concentration. The parameters of leaf wash pH and electrical conductivity demonstrated that the physiology of plants is impacted by the amount of air pollutants such as $SO_2$ and $NO_2$ as well as suspended particle matter. According to the research, the pH of leaf wash tends to be neutral in less contaminated areas and acidic in more polluted areas.

**Table 1:** Different parameters of leaves of *Mangifera indica* L.

| S. No. | Parameters | Less polluted site | More polluted site | Percentage reduction % |
|---|---|---|---|---|
| 1. | Leaf area $cm^2$ | 40.24±1.08 | 35.38±2.01 | 11.23 |
| 2. | Biomass $gm/m^2$ | 25.63±2.02 | 27.18±3.14 | 6.17 |
| 3. | Leaf area Biomass ratio | 1.67±1.32 | 1.34±1.11 | 18.38 |
| 4. | Chlorophyll a | 3.32±1.04 | 2.87±1.09 | 16.06 |
| 5. | Chlorophyll b | 2.94±2.06 | 2.04±2.01 | 30.63 |
| 6. | Total chlorophyll | 6.03±0.8 | 4.65±0.12 | 21.27 |
| 7. | pH of leaf wash | 6.64±2.05 | 6.16±2.17 | 7.48 |
| 8. | Electrical conductivity of leaf wash micromohas | 0.62±0.04 | 0.41±0.07 | 42.16 |

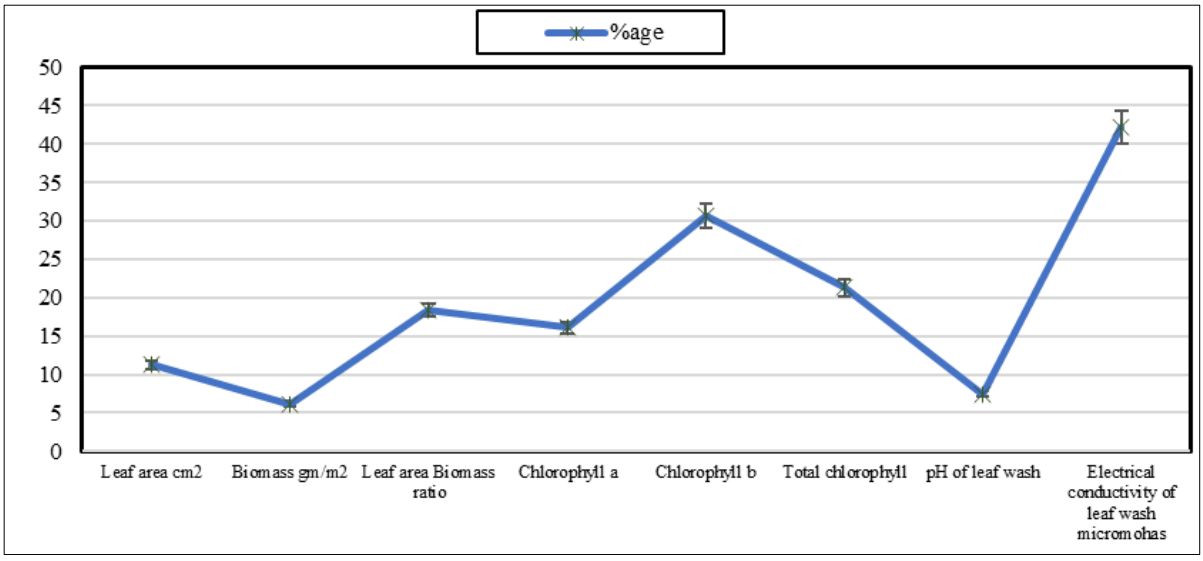


**Fig 1:** Graph analysis of percentage different parameters of Leaves of *Mangifera indica* L.

## Conclusion

There are numerous ways that air pollution can impact human health. Air pollution has been linked in numerous scientific studies to a number of health issues, such as:

- Worsening of cardiovascular and respiratory diseases.
- Reduced lung function.
- Increased frequency and intensity of respiratory symptoms, such as coughing and difficulty breathing.
- Increased vulnerability to respiratory infections.
- Effects on the nervous system, including the brain, including impairments in learning, memory, and behaviour.
- Cancer; and
- Early death. Those with pre-existing heart and lung conditions (such as heart failure/ischemic heart disease, asthma, emphysema, and chronic bronchitis), diabetics,

older adults, and children seem to be more susceptible to the negative health impacts of air pollution.

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**References**

1. Bhandarkar S. Vehicular pollution, their effect on human health and mitigation measures. Vehicle Eng. 2013;1(2):33-40.
2. Giri S, Shrivastava D, Deshmukh K, Dubey P. Effect of air pollution on chlorophyll content of leaves. Curr Agric Res J. 2013;1(2):93-98.
3. Khan AM, Pandey V, Shukla J, Singh N, Yunus M, Singh SN, *et al*. Effect of thermal power plant emission on *Catharanthus roseus* L. Bull Environ Contam Toxicol. 1990;44:865-870.
4. Li MH. Peroxidase and superoxide dismutase activities in fig leaves in response to ambient air pollution in a subtropical city. Arch Environ Contam Toxicol. 2003;45:168-176.
5. Liu YJ, Ding H. Variation in air pollution tolerance index of plants near a steel factory: implication for landscape-plant species selection for industrial areas. WSEAS Trans Environ Dev. 2008;4:24-32.
6. Naveed NH, Batool AI, Rehman UF, Hameed U. African J Environ Sci Tech. 2010;4(11):770-774.
7. Pathak RK, Tomar CN, Mahajan S. Phytomonitoring of atmospheric pollution in roadside perennial trees of Indore city (M.P.). Int. J Adv Eng Technol. 2015;7(6):1727-1734.
8. Rai PK. Environmental magnetic studies of particulates with special reference to biomagnetic monitoring using roadside plant leaves. Atmos Environ. 2013;72:113-129.
9. Rao CS. Environmental Pollution Control Engineering. New Age International Publications. Revised 2nd Ed.; c2006.
10. Saquib M, Ahmad A, Ansari K. Ecoprint. 2010;17:35-41.
11. Seyyed MS, Koochak H. International Conference on Environmental, Biomedical and Biotechnology, IPCBEE. 2011;16:98-101.
12. Silva LC, Oliva MA, Azevedo AA, Araújo JM, Aguiar R. Micromorphological and anatomical alterations caused by simulated acid rain in Restinga plants, *Eugenia uniflora* and *Clusia hilariana*. Water Air Soil Pollut. 2005;168:129-143.
13. Stevovic S, Mikovilovic VS, Dragosavac CD. Environmental impact on morphological and anatomical structure of tansy. Afr J Biotechnol. 2010;9(16):2413-2421.
14. Tiwari S, Agrawal M, Marshall FM. Evaluation of ambient air pollution impact on carrot plants at a suburban site using open top chambers. Environ Monit Assess. 2006;119:15-30.