

IMPACT OF AUTOMOBILE POLLUTION ON PLANTS IN DAMOH DISTRICT (MP), INDIA

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ABSTRACT :- The paper gives an account on the impact of automobile pollution on plants in Damoh district. With the increasing population the use of automobile vehicles is also increasing. These vehicles release chemicals that pollute the air and are known as automobile emissions. These emissions include greenhouse gases, air pollutants like nitrogen oxides (NOx), carbon monoxide (CO), particulate matter (PM), volatile organic compounds (VOC) which harm plants by depositing pollutants on leaves, leads to shortening of leaves, petiole and internodes, chlorosis (yellowing of leaves), shortening of plant height and thickening of stem. Air pollutants can have detrimental effects on plants, with pollutant particles indirectly impacting plant growth when deposited on soil. Pollutants from vehicles settle on leaf surfaces, obstructing stomata and interfering with transpiration processes. These accumulations hinder carbon dioxide uptake, ultimately reducing photosynthesis and negatively affecting plants growth and productivity.

KEYWORDS: Automobile, Pollution, Plants, Vehicular Emissions, Electric Vehicles.

INTRODUCTION:-

Damoh is a historical and district place of Madhya Pradesh State located in Central India. The district is part of Sagar Division. It is situated in the north-eastern part of the State and geographically located at 23 deg. 09' north latitude and 79 deg. 03' east longitude. The district is surrounded by Sagar in the west, Narsinghpur & Jabalpur in the South, Chhatarpur in the North, Panna and Katani in the east. The Damoh city is situated in a plateau region about 12 miles (19 km) south-east of the Sonar River. It is at an average elevation of 595 meters (1,952 ft.). The district of Damoh has an area of 7,306 square km (2,821 sq. mi). The city's name comes from Damayanti, the wife of King Nal of Hindu mythology. Damoh was part of the province (Subah) of Malwa

during the reign of the Mughal emperor Akbar. The district has several old sculptures, including those of the Hindu deities Shiva, Parvati, and Vishnu. The current estimate population of Damoh city in 2025 is 180,000. The last census was conducted in 2011 is 125000 and the schedule census for

Damoh city in 2021 was postponed due to Covid. The population is increasing that's why there is a higher demand for transportation, leading to more automobiles on the roads.



Figure: Map of District Damoh (MP)

The use of automobiles is also increasing due to factors like urbanization, improved infrastructure, changing lifestyles that favor convenience, and technological advancements making automobiles more accessible and affordable.

Automobiles in India primarily run on gasoline or diesel fuel. The quality of these fuels is often compromised due

to unlawful adulteration, and the engines in Indian vehicles tend to be inefficient, resulting in higher levels of pollution. A study conducted in 1994 estimated that vehicular emissions in 12 major Indian cities contributed 3596.8 tons of pollutants per day, representing a substantial portion of the overall air pollution in these urban areas.

Objective of study:

The objective of this paper is to study the impact of automobile pollution on plants in Damoh district. Some objectives are summarized in the following –

1. To observe the higher levels of pollution affecting on plants.
2. To observe the Air pollutants can have detrimental effects on plants.
3. To observe the phenomenon activities on plants.
4. To observe how decrease the productivity of roadside plants.
5. To observe accumulations hinder carbon dioxide uptake, ultimately reducing photosynthesis and negatively affecting plants growth and productivity.

REVIEW OF LITERATURE:-

Vehicular pollution is a substantial global environmental issue that contributes to the degradation of ecosystems and air quality. Pollutants, such as particulate matter, nitrogen oxides, Sulphur dioxide and heavy metals, exert a direct influence on plants, which are crucial for maintaining ecological balance and promoting environmental health. This search understood the physical, chemical, and biological effects of vehicular pollution on plants, with a particular emphasis on the effects on photosynthesis, growth, and ecosystem services. In terms of the effects on plants and their relatively high concentrations in exhaust emissions, nitric oxide (NO) and nitrogen dioxide (NO_x) are the prime pollutants associated with road transport which are toxic to plants. Mikail Acar (2023) *Micros Res. Tech.* studied the effect of auto- exhaust pollution on leaf anatomy and micromorphology of *Pistacia vera* L., Their observations revealed distinct anatomical and micro morphological variations between plants growing in rural areas and those in urban centres with heavy traffic and high air pollution levels.

Notable differences were observed in several key features, including the surface of the epidermis, structure of the cuticle, density of trichomes, characteristics of stomata, thickness of the mesophyll, and width of the epidermis anticlinal outer wall. Auto exhaust affects not only plant growth but also subsequent generations. However, minute amounts of other nitrogen-containing compounds including nitrous acid (HONO), nitrous oxide (N_xO) and ammonia (NH₃) may also be found in vehicle emissions. The combustion process releases various pollutants, including Sulphur dioxide and volatile organic compounds, along with carbon-containing particles resulting from fuel droplets that have not fully burned. (Colville et al. 2001), Vehicle exhaust emissions have significant detrimental effects on plant growth and development in urban environments. Studies have shown that realistic levels of vehicle exhaust pollution can directly impact urban vegetation, causing species-specific changes in growth, phenology, and leaf surface characteristics (Honour et al., 2008). Exposure to nitrogen oxides (NO_x) from diesel exhaust resulted in hastened senescence and late flowering (Honour et al., 2008). Studies comparing plants grown from seeds exposed to pollution and those from unpolluted seeds revealed differences in growth patterns and physiological characteristics. Plants from polluted seeds exhibited reduced growth, along with decreased production of chlorophyll, ascorbic acid, and proteins (Qadir and Iqbal (1991).

Interestingly, ethylene, a plant hormone present in motor vehicle exhaust, is also a significant air pollutant affecting plant growth. In urban areas with high ethylene concentrations, plants exhibited reduced growth, premature senescence, and decreased flowering and fruit production (Abeles & Heggstad, 1973). However, not all pollutants have entirely negative effects. Low-level exposure to sulphur dioxide (SO₂), which can be emitted from heating systems, may have a positive impact on plants as Sulphur is an essential nutrient for growth (Lee et al., 2017).

METHODOLOGY:-

The plants grown in roadside areas are constantly exposed to tremendous vehicular pollutants. These plants are exposed to the exhaust smoke pollutants of vehicles

from morning to night. Five species of plants were observed from this area and the same five species of

plants are observed from the areas of very less vehicular emissions like park, colonies etc.

Table (1):- The following plants were observed from the above sites

S. No.	Name of Species	Name of family	Trivial name
1	<i>Bougainvillea Spectabilis</i>	Nyctaginaceae	Paper Flower
2	<i>Calotropis gigantean</i> L. Ait.f	Asclepiadaceae	Aak
3	<i>Catharanthus roseus</i> L. Don.	Apocynaceae	Bright eyes
4	<i>Narium odorum</i> Soland	Apocynaceae	Kaner
5	<i>Tridax procumbens</i> Linn.	Asteraceae	Ghamra

Analysis:

Automobile emissions significantly impact plant growth through various pollutants. These pollutants are known to adversely affect plant health by disrupting photosynthesis, harming leaf structures, and modifying soil composition. The morphological characters such as size of leaves, internodes, petioles, color of leaves, color of flowers and thickness of stem were compared between the plants of polluted areas and plants of unpolluted areas. (From table no. 1)

Table (2):- The following *Bougainvillea Spectabilis* observed from the above sites

S. No.	Character Observed	Unpolluted areas	Polluted areas
1	Leaves colour	Green	Pale green
2	Flower colour	Bright pink	Pale pink
3	Petiole size	Large	Short

Table (3):- The following *Calotropis gigantean* L. Ait. F., observed from the above sites

S. No.	Character Observed	Unpolluted areas	Polluted areas
1	Plant height	Long: (1-5m)	Short: (1-3m)
2	Leaves colour and size	Green & large	Pale green & small
3	Internode size	Long	Short

Table (4):- The following *Catharanthus roseus* L. Don., observed from the above sites

S. No.	Character Observed	Unpolluted areas	Polluted areas
1	Stem thickness	Thin	Thick
2	Leaves size	Large	Small
3	Internode size	Large	Small

Table (5):- The following *Narium odorum* Soland, observed from the above sites

S. No.	Character Observed	Unpolluted areas	Polluted areas
1	Leaves colour	Dark Green	Pale Green
2	Leaves size	Large (17-20*1.5-2.5cm)	Small (10-13*1-1.5cm)
3	Internode size	Long	Short
4	Petiole size	Large	Small
5	Stem thickness	Thin	Thick

Table (6):- The following *Tridax procumbens* Linn., observed from the above sites

S. No.	Character Observed	Unpolluted areas	Polluted areas
1	Leaves colour	Dark Green	Pale Green
2	Leaves size	Large	Small
3	Internode size	Long	Short
4	Petiole size	Large	Small

RESULT & DISCUSSION:-

The result is cleared that from table no. (2) To table no. (6), It has been observed that the plants growing in polluted areas and are constantly exposed to vehicular emissions have shorter leaves, petioles and internodes, pale leaves, thicker stems as compared to the plants grown in areas with very less vehicular emissions.

CONCLUSION:-

Automobile emissions significantly impact plant growth through various pollutants. The adoption of electric vehicles (EVs) offers a promising solution to mitigate the detrimental impacts of vehicle emissions on plant life. In contrast to conventional combustion engine automobiles, EVs generate no direct emissions, thereby eliminating the release of harmful substances like nitrogen oxides, particulate matter, and carbon dioxide during operation. These pollutants are known to adversely affect plant health by disrupting photosynthesis, harming leaf structures, and modifying soil composition. A shift towards EVs can lead to a decrease in the levels of these noxious substances in both air and soil, creating more favorable conditions for plants in urban and suburban settings.

Moreover, the diminished formation of ground-level ozone, which results from the interaction between vehicle emissions and sunlight, can further enhance plant growth and productivity. As the use of EVs becomes more widespread, we can anticipate improvements in air quality and a corresponding positive effect on the vitality and diversity of plant ecosystems in areas impacted by high traffic volumes.

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