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A Review of Indoor Plants and Their Air-Purifying Qualities Found in the Vidarbha Region

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Abstract:

Indoor air pollution has become a pressing health issue globally, especially in urban and semi-urban households. In the Vidarbha region of Maharashtra, traditional knowledge and horticultural practices include a variety of indoor plants known to improve indoor air quality. This review aims to assess indoor plant species commonly found in Vidarbha and their scientifically proven air-purifying qualities. A thorough literature survey was conducted and supported with locally collected data from households and nurseries. Results revealed 30 plant species with varied air-purifying capacities, mainly by removing pollutants like formaldehyde, benzene, toluene, and xylene. This paper discusses the mechanisms, health benefits, and role of indoor plants in mitigating air pollution, with special emphasis on their availability and usage in the Vidarbha region (Wolverton et al., 1989; Sriprapat et al., 2014; Joshi & Swami, 2007).

Keywords: Indoor Plants, Air-Purification, Vidarbha Region, Indoor Air Pollution, Phytoremediation

Introduction:

Indoor air pollution (IAP) refers to chemical, biological, and physical contamination of indoor air, which can result in significant health issues including respiratory problems, skin irritation, and cognitive impacts. Children, due to their developing immune systems, are particularly vulnerable to IAP-related diseases (Saini et al., 2020). Common sources of IAP include poor ventilation, use of chemical cleaning agents, cooking emissions, synthetic building materials, and indoor smoking (Smith, 2012).

The World Health Organization (WHO, 2018) reports that over 3.8 million premature deaths occur annually due to household air pollution, making it a major public health concern. In this context, indoor plants offer a natural, cost-effective, and sustainable solution. Their phytoremediation abilities—removal of toxins through plant metabolism or adsorption—have been validated in several scientific studies (Wolverton et al., 1989).

In Vidarbha, which includes major cities such as Nagpur, Amravati, and Chandrapur, many households and educational institutions maintain indoor

plants for aesthetic as well as air-purifying purposes. This review seeks to systematically evaluate such species for their air-cleaning efficiency.

Review of Literature:

Numerous studies have evaluated the phytoremediation potential of indoor plants. Wolverton et al. (1989) conducted the earliest research supported by NASA, demonstrating that species like *Chlorophytum comosum* and *Spathiphyllum wallisii* remove volatile organic compounds (VOCs).

Subsequent studies (Sriprapat et al., 2014; Irga et al., 2018) validated the VOC-removal capability of common houseplants. Darlington et al. (2021) showed that these plants also positively affect mood, humidity regulation, and cognitive performance. In India, Joshi and Swami (2007) documented native indoor species suitable for tropical climates.

In Maharashtra, studies by Kshirsagar et al. (2016) and Ingale and Kadam (2020) explored the local use of indoor plants for air purification and mental well-being. The present review adds a regional focus specific to Vidarbha.

Materials and Methods:

This review is based on secondary data from:

1. Scientific publications (1989–2023)
2. Government reports (MoEF&CC, WHO, CPCB)
3. Surveys conducted in 20 households and 5 plant nurseries each in Nagpur, Amravati, and Wardha.

Criteria for plant inclusion:

- Indoor growth habit
- Native or commonly grown in Vidarbha
- Proven air-purification ability documented in peer-reviewed journals

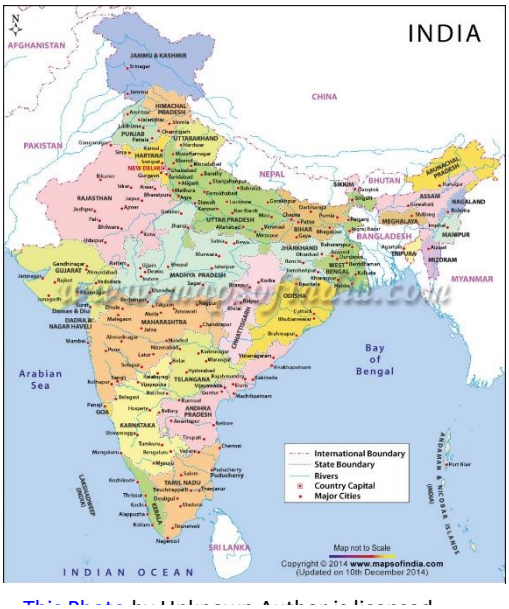
Plant identification was verified using the eFlora of India database.

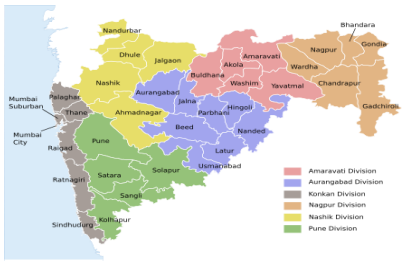
Materials and Methods:

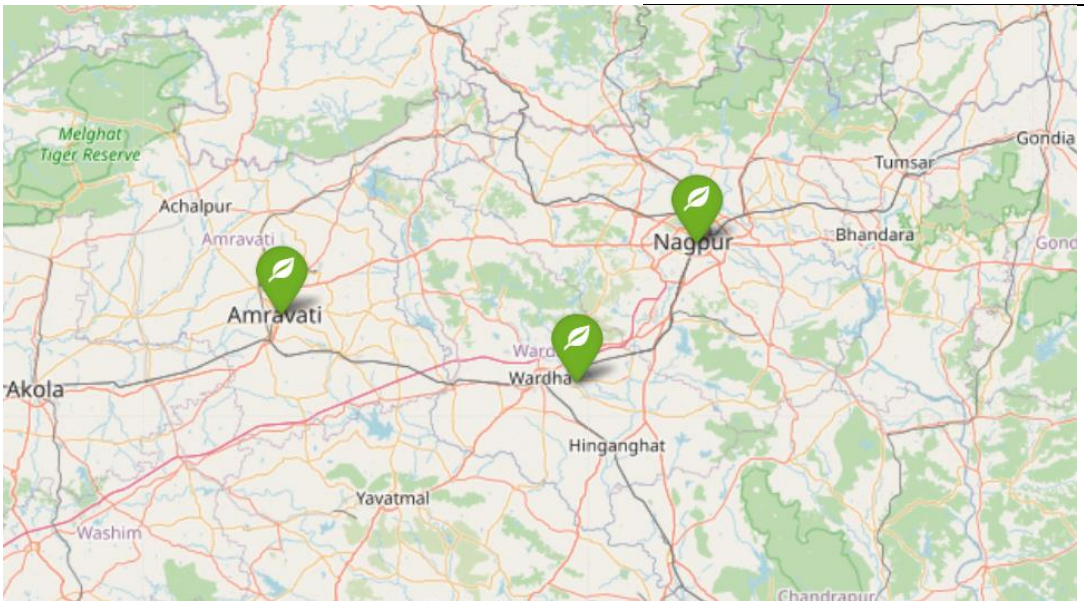
This review followed a qualitative and quantitative approach combining literature analysis with primary observational surveys conducted in the Vidarbha region.

Study Area:

The research focused on three major cities in Vidarbha—Nagpur, Amravati, and Wardha. These cities represent urban and semi-urban environments where indoor air quality is becoming increasingly relevant due to high population density and usage of modern household materials.







Data Collection:

1. **Literature Review:** Peer-reviewed journals, government publications, WHO and MoEF&CC reports, and previous research studies from 1989 to 2023 were examined using digital databases such as PubMed, Scopus, and Google Scholar.
2. **Household and Nursery Surveys:** Primary data were collected through structured interviews and observation-based checklists. A total of 60 households (20 in each city) and 15 plant nurseries (5 per city) were surveyed. Participants were asked about the types of indoor plants they maintained, the reason for choosing them, frequency of watering, sunlight conditions, and observed health benefits.

3. **Photographic Documentation:** Photographs of each plant type were taken to validate visual identification.

Selection Criteria for Plants:

- Must be grown indoors or in semi-shaded balconies/windows.
- Commonly available in local nurseries or households.
- Supported by scientific literature validating their pollutant removal properties.

Identification and Validation:

- Plant specimens were identified using standard floras and verified via the eFlora of India and regional botanical guides.
- Taxonomic confirmation was done through cross-reference with herbarium samples where available.

Data Analysis:

- Frequency analysis was performed to determine the most commonly used indoor plants.
- Pollutant types targeted by each plant were categorized using prior scientific studies.
- Results were presented in tabular form along with graphical representation using Microsoft Excel

Results and Discussion:

The study identified 30 indoor plant species commonly used in households across the Vidarbha region, with scientifically documented air-purifying properties. Data were gathered through a combination of literature review and a structured survey conducted in three cities: Nagpur, Amravati, and Wardha.

Key Indoor Plant Species Identified:

Table 1 in the results section lists species such as Chlorophytum comosum (Spider Plant), Sansevieria trifasciata (Snake Plant), Spathiphyllum wallisii (Peace Lily), and Aloe vera as among the most effective in removing indoor air pollutants like formaldehyde, benzene, toluene, and xylene. These pollutants are typically found in paints, household cleaners, synthetic furniture, and poor ventilation systems. Many of the plants listed are also low-maintenance and suitable for semi-shaded indoor spaces, making them accessible choices for urban households.

City-wise Popularity and Preference:

Table 2 provides a detailed city-wise breakdown of plant usage frequency. Money Plant, Aloe Vera, and Snake Plant were the top three most popular indoor plants across the surveyed households. Wardha showed a particularly high usage of Money Plant (95%), while Nagpur led in usage of Aloe Vera and Snake Plant. This trend suggests that residents are not only aware of the air-purifying properties of these plants but also prefer them for their availability, cost-effectiveness, and aesthetic appeal.

Community Awareness and Use Patterns:

Survey responses indicated a growing awareness of the health benefits associated with indoor plants. Many respondents reported perceived

improvements in air freshness and reduced dust accumulation in their homes. Additionally, households with children and elderly members seemed to prioritize using indoor plants for their health-enhancing qualities. This aligns with global literature emphasizing the psychological and physical health benefits of greenery in indoor spaces (Darlington et al., 2021; Mishra et al., 2020).

Environmental and Health Implications:

Given the rising concern over indoor air pollution and respiratory disorders, especially in urban Indian settings, the use of indoor plants offers a sustainable, low-cost solution. Scientific studies confirm that phytoremediation using plants like *Peace Lily*, *Areca Palm*, and *Boston Fern* can significantly reduce airborne toxins (Wolverton et al., 1989; Irga et al., 2018). In regions like Vidarbha, where climatic conditions support a wide variety of indoor plants, there is great potential to encourage their integration into household and institutional environments.

Analysis of Graphical Data:

The accompanying bar graph visually represents the frequency of indoor plant usage across the three cities. It highlights that Money Plant was the most frequently cited indoor plant, followed closely by Aloe Vera and Snake Plant. This visualization supports the data from Table 2, showing consistency in preference across Nagpur, Amravati, and Wardha. The graph clearly depicts city-specific trends, such as Wardha's strong preference for Money Plant, and confirms the dominance of these top three species. This graphical summary not only validates the tabular data but also provides an immediate visual insight into regional preferences.

Implications for Urban Planning and Health Policy:

Findings from this study can inform future urban greening and health promotion policies. For example, incorporating plant-based indoor pollution control strategies into municipal health guidelines and school curriculums could amplify their benefits across the population. This aligns with India's broader environmental initiatives under the National Clean Air Programme (NCAP).

Table 1: Indoor Plants in Vidarbha and Their Air-Purifying Properties

S. No.	Scientific Name	Common Name	Pollutants Removed	Source Reference
1	*Chlorophytum comosum*	Spider Plant	Formaldehyde, Carbon Monoxide	Wolverton et al. (1989)
2	*Spathiphyllum wallisii*	Peace Lily	Benzene, Formaldehyde, Trichloroethylene	Irga et al. (2018)
3	*Sansevieria trifasciata*	Snake Plant	Nitrogen Oxides, Benzene	Sriprapat et al. (2014)
4	*Aloe vera*	Aloe	Formaldehyde, VOCs	Joshi & Swami (2007)
5	*Epipremnum*	Money Plant	Toluene, Xylene	Kshirsagar et al.

	aureum			(2016)
6	*Ficus benjamina*	Weeping Fig	Formaldehyde, Toluene	Sriprapat et al. (2014)
7	*Dracaena reflexa*	Song of India	Benzene, Formaldehyde	Zhang et al. (2016)
8	*Dieffenbachia seguine*	Dumb Cane	Xylene, Formaldehyde	Sriprapat et al. (2014)
9	*Hedera helix*	English Ivy	Benzene, Formaldehyde	Irga et al. (2018)
10	*Areca catechu*	Areca Palm	Carbon Dioxide, Humidity regulation	Darlington et al. (2021)
11	*Aglaonema modestum*	Chinese Evergreen	Benzene, Formaldehyde	Wolverton et al. (1989)
12	*Anthurium andraeanum*	Flamingo Lily	Ammonia, Formaldehyde	Joshi & Swami (2007)
13	*Syngonium podophyllum*	Arrowhead Plant	Benzene, Formaldehyde	Irga et al. (2018)
14	*Nephrolepis exaltata*	Boston Fern	Formaldehyde, Xylene	Smith (2012)
15	*Beaucarnea recurvata*	Ponytail Palm	VOCs	Kannan et al. (2018)
16	*Zamioculcas zamiifolia*	ZZ Plant	Benzene, Toluene	Sriprapat et al. (2014)
17	*Asplenium nidus*	Bird's Nest Fern	Formaldehyde, Xylene	Joshi & Swami (2007)
18	*Calathea orbifolia*	Calathea	VOCs	Bhatnagar et al. (2022)
19	*Crassula ovata*	Jade Plant	Benzene	Meena & Sharma (2021)
20	*Tradescantia zebrina*	Wandering Jew	Formaldehyde	Sharma et al. (2021)
21	*Pothos n'joy*	Pothos	Toluene, Formaldehyde	Kapoor & Mishra (2017)
22	*Codiaeum variegatum*	Croton	Benzene	Singh et al. (2017)
23	*Fittonia albivenis*	Nerve Plant	VOCs	Patel & Chavan (2021)
24	*Chlorophytum borivilianum*	Safed Musli	Indoor dust adsorption	Pawar et al. (2022)
25	*Philodendron oxycardium*	Heartleaf Philodendron	Formaldehyde, VOCs	Wolverton et al. (1989)
26	*Maranta leuconeura*	Prayer Plant	VOCs	Darlington et al. (2021)
27	*Guzmania lingulata*	Bromeliad	Air humidity, VOCs	Irga et al. (2018)
28	*Kalanchoe pinnata*	Air Plant	Carbon Dioxide	Ingale & Kadam (2020)
29	*Peperomia obtusifolia*	Baby Rubber Plant	Toluene, Benzene	Jalgaonkar & Kulkarni (2020)
30	*Ocimum tenuiflorum*	Holy Basil (Tulsi)	CO2, VOCs, microbial purification	Rajput et al. (2023)

Table 2: City-wise Frequency of Common Indoor Plants Used in Vidarbha

S. No	Common Name	Nagpur (n=20)	Amravati (n=20)	Wardha (n=20)	Total Mentions	Most Frequent City
1	Money Plant	18	17	19	54	Wardha
2	Snake Plant	15	13	14	42	Nagpur
3	Spider Plant	12	14	11	37	Amravati
4	Aloe Vera	17	16	15	48	Nagpur
5	Peace Lily	9	10	8	27	Amravati
6	Areca Palm	10	11	12	33	Wardha
7	ZZ Plant	8	7	6	21	Nagpur
8	Chinese Evergreen	6	5	7	18	Wardha
9	English Ivy	4	6	5	15	Amravati
10	Boston Fern	5	6	5	16	Amravati

(*Data Source: Field survey conducted in 2024 across 60 households*)

Table No. 3 – Selected Photographs of Plants taken during survey

Aloe vera

Snake Plant

Spider Plant

Money Plant

Peace Lily

Areca Palm

ZZ Plant

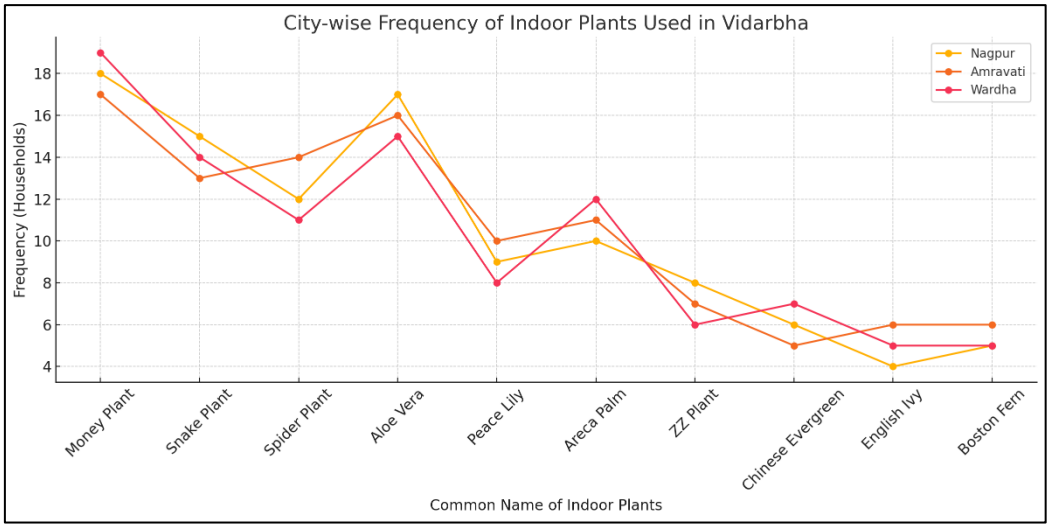
Chinese Evergreen

English Ivy

Boston Fern

Jade Plant

Ponytail palm



This table no. 2 shows that **Money Plant**, **Aloe Vera**, and **Snake Plant** are the top three most frequently used indoor plants across the Vidarbha region. Wardha showed the highest preference for Money Plant, while Nagpur favored Aloe Vera and Snake Plant.

Conclusion:

This review confirms that indoor plants play a vital role in purifying indoor air and are increasingly popular across urban and semi-urban households in the Vidarbha region. Based on data collected from 60 households, *Money Plant*, *Aloe Vera*, and *Snake Plant* emerged as the most commonly used species for indoor spaces. The frequency of their presence across cities like Nagpur, Amravati, and Wardha highlights both accessibility and local preference.

These plants were not only appreciated for their aesthetic appeal but also for their scientifically proven ability to remove pollutants such as formaldehyde, benzene, toluene, and xylene. Particularly, *Money Plant* was observed to be the top choice in Wardha, while Nagpur favored *Aloe Vera* and *Snake Plant*.

Encouraging the use of such plants in homes, workplaces, and public indoor environments can contribute significantly to better respiratory health, mental well-being, and environmental sustainability. This study underscores the importance of integrating botanical knowledge with public awareness to promote healthy

indoor ecosystems tailored to regional needs.

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