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Study on the Role of Plants in Air Purification and Some Anti Pollutant Plants

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Abstract

Plants play a crucial role in combating pollution by absorbing pollutants, purifying the air, and improving overall environmental quality. Although air-purifying plants have the ability to absorb pollutants and enhance indoor air quality, there has been an increase in research on these plants. The ultimate objective of several studies has been to find plants that are capable of efficiently eliminating common indoor air contaminants such as trichloroethylene, carbon mono oxide, formaldehyde, ammonia, benzene, and xylene. We have obtained some 20 plants commonly studied for their air-purifying properties. The plant species known for their air-purifying properties were selected from different areas. They have the capacity to remove toxins and improve air quality, which has led to further research in this area. When using these plants to purify the air, it's important to take into account many elements such as the size of the space, the quantity of plants, and the kind and concentration of pollutants present. The present study signifies the need of the systematic confirmation of anti-pollutant plants. This will not only offer recognition of this useful information but will also support in protection of such steadily important plants to cure environmental pollution.

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1. INTRODUCTION

Air is an essential factor for life; therefore, a decrease in its quality due to pollution has various impacts depending on the types of pollutants, its concentration, and the environmental condition. Anti-pollutant plants" or "air-purifying plants" are a broad category of plants that are valued for their capacity to reduce air pollution by drawing hazardous substances out of the surrounding environment.[1] Due to their innate capacity to reduce both indoor and outdoor air pollution, these plants have drawn notice as a viable and visually beautiful way to counteract the negative impacts of pollution. The scientific subject of phyto remediation, which investigates how plants might absorb, metabolise, or neutralise toxins in their surrounding environment, is the foundation for the idea of anti-pollutant plants. Some plant species have shown through this method to be remarkably effective at eliminating common indoor and outdoor air pollutants, such as formaldehyde, benzene, xylene, volatile organic compounds (VOCs), and other particulate matter. Due to the serious health risks associated with indoor air pollution, air pollutant plants have become more and more common in interior environments like businesses, homes, and public areas.[2] People may be able to lower their exposure to dangerous pollutants and enhance the general quality of indoor air by carefully positioning these plants indoors. Incorporating air polluting plants into urban landscapes can also help reduce outdoor air pollution, improving the quality of air that people breathe in crowded regions. [6,7] The health risks associated with indoor air pollution have grown significantly, and their sources

range from furniture and building materials to household cleaning supplies. Long-term exposure to indoor air pollution can cause allergies, headaches, and respiratory problems, among other health problems. [4,5] By reducing air pollution and promoting a better living environment, anti-pollutant plants provide a safe and efficient way to reduce these hazards. NASA conducted a thorough investigation of this innate capacity to purify the air in the late 20th century as part of their endeavours to establish environmentally friendly living quarters in space. [13] NASA carried out the Clean Air Study in 1989 to look into the possibility of using houseplants to clean the air in space stations. According to the study, some plants have the ability to eliminate up to 87% of volatile organic compounds (VOCs) from the atmosphere in a single day. [10,17] The study demonstrated the efficacy of plants like the Snake Plant (*Sansevieria trifasciata*), Peace Lily (*Spathiphyllum* spp.), and Spider Plant (*Chlorophytum comosum*) in eliminating formaldehyde, benzene, and trichloroethylene. [16]

2. OBJECTIVES

The main objective of the present study was to explore the significance of anti-pollutant plants to provide long-term, practical solutions for reducing air pollution and enhancing human health and welfare.

3. MATERIALS AND METHOD

The plant species known for their air-purifying properties were selected from different areas. These species were chosen based on previous research demonstrating their effectiveness in removing specific pollutants from the air. The identification and knowledge about plant material was carried out with the aid of standard floras given by Hens Flora (1925), Verma *et al.*, (1993), Singh *et al.*, (2001) [14,15]. Plants with their anti-pollutant properties were categorized by their local name, botanical name, family name, plant parts used, mode of functions and uses. The identification of plants was also done using the references of Flora of British India by Hooker (1875) and herbaceous flora of Dehradun by C.R. Babu (1977) [03]. We have obtained some 20 plants commonly studied for their air-purifying properties.

4. RESULT AND DISCUSSION

20 anti-pollutant plants were selected from different areas. They have been documented along with their anti-pollutant effect mentioned in for going table number 1. A total of 20 plant species belonging to 20 genera and 10 family were reported for different air purifying properties to cure indoor and outdoor environmental pollution. [8,9] The plants were used as anti-pollutant was enumerated alphabetically and the local name, family name and role of plant as air purifier has documented as follows in table no.1. *Araceae* was the dominant family with 07 species followed by Asparagaceae with 04 species, *Arecaceae* with 03 species, *Moraceae* with 02 species then 01 plant species of *Lamiaceae*, *Meliaceae*, *Araliaceae* and *Orchidaceae*. Majority of anti-pollutant plants have showed their effect by eliminating carbon di oxide, trichloro ethylene, formaldehyde, xylene, carbon mono oxide, toluene like pollutants from air.

				
Chlorophytum Comosum	***Plectranthus scutellarioide***	***Ficus elastica***	***Spathiphyllum wallisii***	***Dracaena marginata***
				
Rhapis excels	***Swietenia mahagoni***	***Ficus religiosa***	***Hedera helix***	***Epipremnum aureum***

				
Dracaena trifasciata	***Syngonium podophyllum***	***Aglaonema commutatum***	***Colocasia esculenta***	***Dieffenbachia Camille***
				
Dracaena fragrans	***Dypsis lutescens***	***Adelonema wallisii***	***Rhapis excelsa***	***Phalaenopsis amabilis***

Fig 2: Images Of Anti-Pollutant Plants

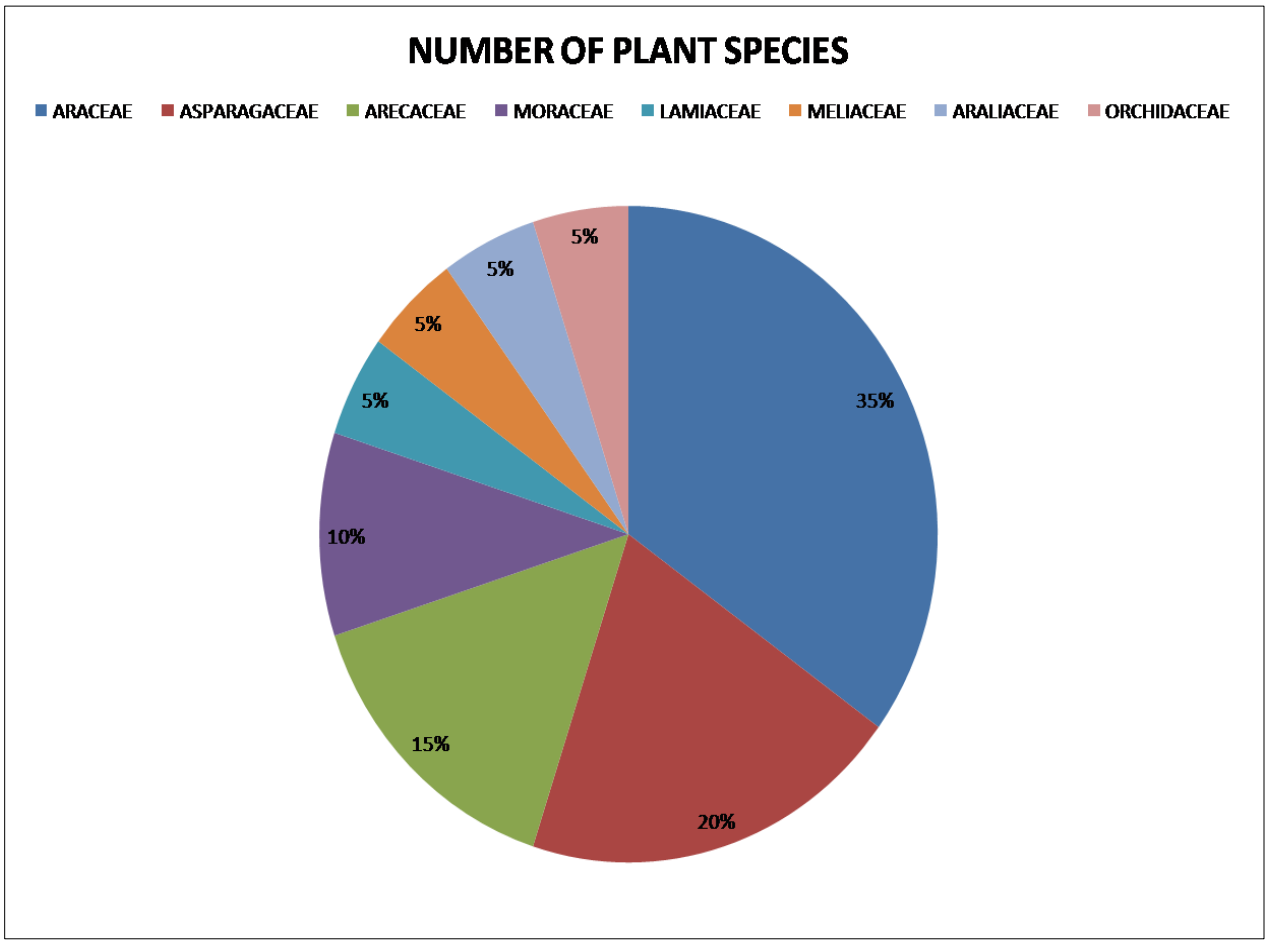

Fig 1 Percent of Plant Family Containing Plant Species with Anti-pollutant Effect

Table 1: Anti pollutant plants with common name, botanical name, family and anti-pollutant effects

S.No.	Common Name	Botanical Name	Family	Anti Pollutant Effects
1	Airplane plant, Spider ivy, Ribbon plant	*Chlorophytum Comosum*	Asparagaceae	Removing harmful chemicals from the air, such as carbon monoxide, xylene, formaldehyde and toluene.
2.	Coleus, Colforsine Forskolin	*Plectranthus scutellarioide*	Lamiaceae	remove indoor toxins
3.	Indian Rubber Tree	*Ficus elastica*	Moraceae	Convert co2 to o2, remove formaldehyde, benzene, carbon mono oxide.
4	Peace Lily, White Sails	*Spathiphyllum wallisii*	Araceae	it removes pollutants like benzene, xylene, carbon monoxide, and formaldehyde are some that a peace lily plant can absorb.
5	Dragon tree, dragon plant, Madagascar dragon tree	*Dracaena marginata*	Asparagaceae	reduce indoor pollution levels with removal of formaldehyde and benzene.
6.	Ground Rattan, Bamboo Palm, Lady Palm, Miniature Fan Palm	*Rhapis excelsa*	Arecaceae	remove harmful toxins such as formaldehyde, ammonia, and xylene
7.	Mahogany	*Swietenia mahagoni*	Meliaceae	Antiseptic, remove greenhouse gases i.e. CFC, methane, carbon mono oxide.
8.	Bodhi Tree, Sacred Fig Tree, Pipul Tree	*Ficus religiosa*	Moraceae	Remove carbon di oxide, release oxygen 24 hours
9.	English ivy	*Hedera helix*	Araliaceae	Remove formaldehyde, benzene, trichloro ethylene.
10.	Money Plant, Devil's Ivy, Ivy Arum	*Epipremnum aureum*	Araceae	Remove formaldehyde, trichloroethene, toluene, xylene, and benzene
11.	Mother-in-law's Tongue, Snake Plant, Spear Plant	*Dracaena trifasciata*	Asparagaceae	remove toxic air pollutants benzene, formaldehyde,xylene, trichloro ethylene, toluene.
12.	arrowhead	*Syngonium podophyllum*	Araceae	Remove even volatile organic compounds such as benzene, formaldehyde, toluene, and xylene.
13.	Chinese Evergreen, Silver Evergreen, Pewter, Painted Drop-Tongue	*Aglaonema commutatum*	Araceae	Remove formaldehyde and benzene.
14.	Elephant's Ear	*Colocasia esculenta*	Araceae	Remove benzene, trichloro ethylene, formaldehyde, ammonia, toluene, carbon mono oxide, styrene.
15.	Corn Plant	*Dracaena fragrans*	Asparagaceae	Remove benzene, tri chloro ethylene, formaldehyde.
16.	Golden cane palm, Areca palm, yellow palm, Butterfly palm	*Dypsis lutescens*	Arecaceae	The plant can break down compounds like acetone, formaldehyde, xylene, and toluene, thus eliminating pollutants and purifying the air
17.	Ground Rattan, Bamboo Palm, Lady Palm, Fern Rhapis	*Rhapis excelsa*	Arecaceae	Eliminate airborne contaminants, including ammonia, formaldehyde, xylene, and carbon dioxide, from homes.
18.	moon orchid, moth orchid, or mariposa orchid	*Phalaenopsis amabilis*	Orchidaceae	Remove benzene, tri chloro ethylene, formaldehyde.
19.	Dumb Cane	*Dieffenbachia Camille*	Araceae	Remove formaldehyde, xylene
20.	King of hearts, Homalomena	*Adelonema wallisii*	Araceae	Remove carbon di oxide

5. CONCLUSION

In conclusion, air pollutant plants offer advantages for the environment and human health as a sustainable and organic way to improve air quality. Individuals and communities can take proactive measures to create cleaner and healthier indoor and outdoor environments by utilising the natural qualities of these plants. Many health advantages, such as decreased exposure to pollutants, better respiratory health, and increased general well-being, can result from the incorporation of anti-pollutant plants into interior spaces, such as homes, workplaces, and public buildings. These indoor plants not only filter the air, but they also enhance the visual and psychological atmosphere by fostering a sense of serenity and connectedness to the natural world. In summary, employing anti-pollutant plants is a comprehensive and sustainable strategy for reducing indoor air pollution. Accepting these plants' inherent ability to purify the air will help us design healthier, more habitable interior spaces that will improve everyone's quality of life.

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