AIR PURIFIER

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ABSTRACT

The air that you breathe in any indoor locations is not as fresh as our body needs. The risk of illness, due to the pollutants present in air is high. A research has been carried out on plants, which are the basic and naturally available air purifiers. The plants of Bamboo Palm, Mother in law tongue plant, Peace Lilly, Money plant are considered as the top air purifiers. These plants were collected in a glass container with flat base and side. The CO_2 content in these containers were examined for each plant after 6 hours. A latest Fluorescence technique using was used to determine the CO_2 content and the Mother in law tongue plant proved to be the best air purifier with the least CO_2 content.

Introduction

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The problem with airborne pollutants is that we don't know exactly what effect they may have in the long term. Like cigarettes, lead and arsenic, government regulators have been slow to recognize the wide-ranging effects of airborne chemicals. In fact, only a quarter of the 82,000 chemicals in use in the U.S. have ever been tested for their effects on humans. As a result, an air purifier is now just as important as healthy eating and clean water to a healthier lifestyle.

The walls we use to shelter and protect us from the elements also trap airborne chemicals, gases, odor and particles. Allergies are not only aggravated by airborne particles like dust, pollen and dander, but also by airborne chemicals from cleaning products, flooring and furniture.

Even many of the cleanest homes have poor indoor air quality. That's because most of the materials and products found in our homes today off-gas small amounts of chemicals. Many of the materials and furnishings that go into a newly constructed home off-gas small amounts of chemicals into the air and will continue to do so for years. In the past homes were more porous and allowed for more natural ventilation. Newly constructed homes are air-tight allowing more air pollution to stay inside the home.

Today this problem of air borne pollutants are all over the world. An effective and reliable air purifier is required in such conditions. The natural air purifiers in the form of plants are available in abundant, the best of them can be identified and included in our homes for a more healthy life.

Air Purifying Plants

Indoor plants have immense therapeutic benefits on many levels. The question then becomes which plant is most effective at improving air quality and removing toxins.

Mother-in-Law's Tongue:

(Sansevieria trifasciata)

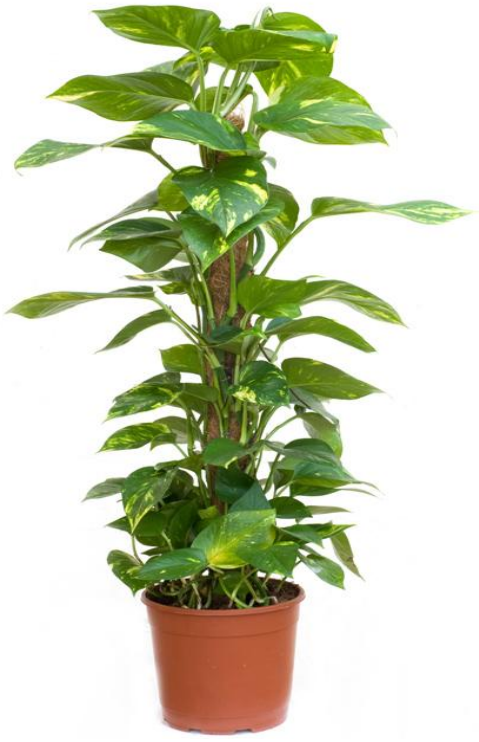
Long, tongue-like leaves with sharp pointed tips earn Sansevieria trifasciata the endearingly euphemistic name of Mother-in-Law's Tongue, although certain varieties also resemble the geometrically patterned scales of a snake. The sturdy leaves of Sansevieria shoot upwards majestically, with beautiful twists and turns that resemble a mobius strip. Sansevieria is an extremely resilient species that can go for weeks without water and seems to thrive in just about any climate, including those with low light, although they do appreciate direct sunlight and fresh air on occasionally.

Money Plant

(Epipremnum aureum):

The ancient art of harmonizing indoor spaces via the strategic placement of furniture, plants and other common household objects involves this plant.

Epipremnum aureum is a powerful air purifying plant that will clean the air in your house very effectively, due to its particular affinity for volatile organic compounds (otherwise known as VOCs) most commonly in the form of off-gassing from synthetic paint or carpets.

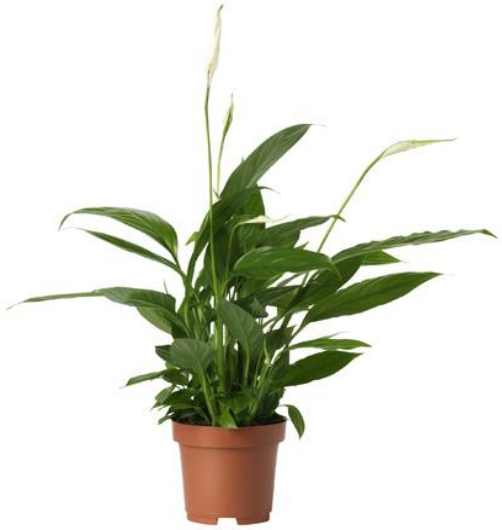


Peace Lily

(Spathiphyllum):

The Peace Lily is a deep, forest green plant with beautiful (although fickle) white flowers. It's a great general cleanser and air purifying plant that effectively removes all common indoor pollutants generated by furniture, electronics and cleaning products.

The Peace Lily does well in indirect light and requires minimal watering with the general guideline being once every four to five days.



Bamboo Palm

(Chrysalidocarpus lutescens):

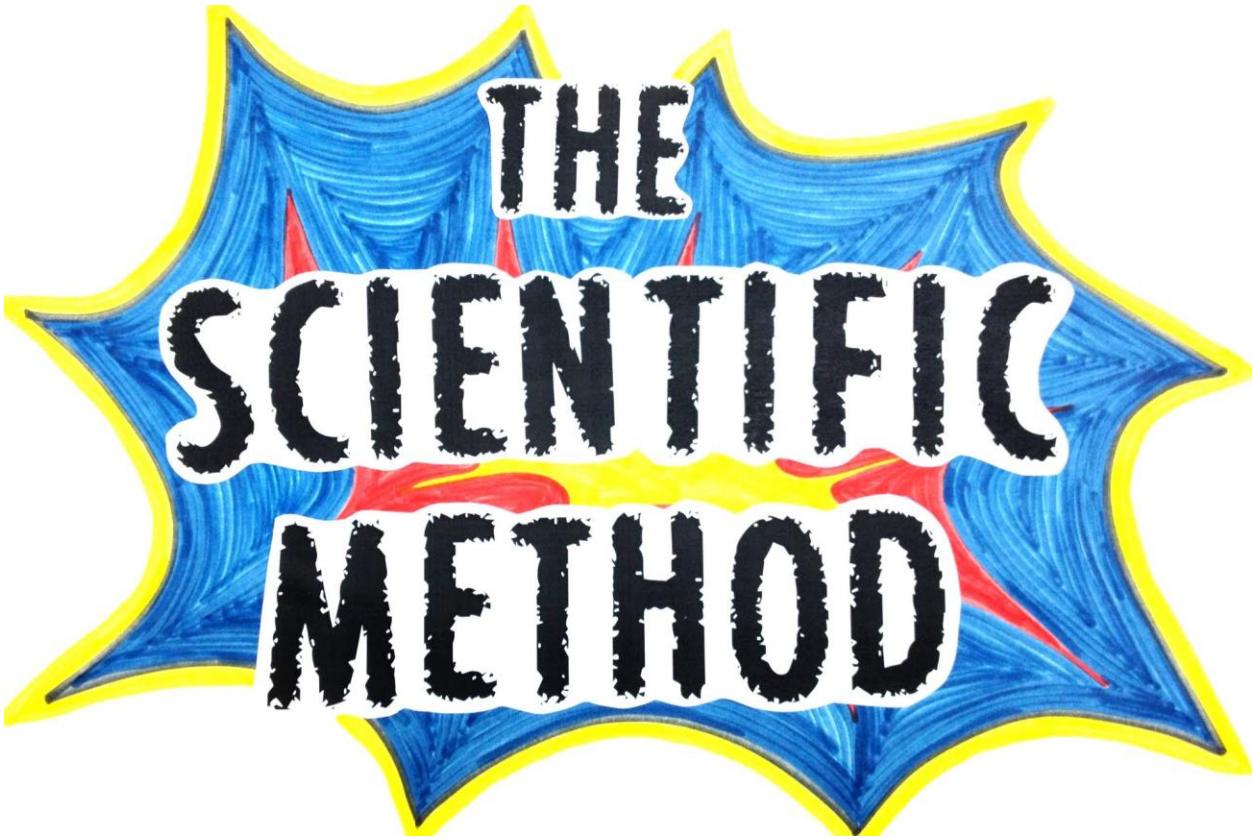
An air purifying plant, with a particular penchant for formaldehydes, benzene and carbon monoxide. As an added benefit beyond air purification, Chrysalidocarpus lutescens is also a natural humidifier, producing a liter of ambient water every 24 hours, making it a well suited plant for dry climates or those with breathing troubles.

Bamboo Palms grow rapidly and can become quite large (up

to 20 feet in height), but you can limit their vertical reach by keeping them confined to smaller pots. They prefer bright, filtered light and enjoy being watered frequently when growing.

Recent Studies:

Researchers set out to find the best ways to clean the air in space stations. Their Clean Air study found that few plants are effective at removing benzene, formaldehyde, and trichloroethylene, xylene, and ammonia from the air—chemicals that have been linked to health effects like headaches and eye irritation.


THE
SCIENTIFIC
METHOD

Fluorescence Technique:

Fluorescence agent used: Dipropylamine.

Working of Dipropylamine as a fluorescence agent:

Molecules of 1,1,2,3,4,5-hexaphenylsilole (HPS) float in an organic solvent, dipropylamine (DPA). HPS has six phenyl rings that stick out like spokes from a central silole group. The rings normally rotate around the bonds that connect them to this hub.

When CO_2 bubbles through this mixture, it reacts with DPA to produce a viscous, polar ionic liquid. The liquid slows the phenyl rings' rotation and pushes the HPS molecules together. As the molecules aggregate, they fluoresce. Because CO_2 and DPA generate more ionic liquid as gas concentrations increase, the fluorescence intensity mirrors CO_2 levels.

While electrochemical and IR methods are only useful for analyzing gas mixtures that contain less than half CO_2, this new approach can measure up to 100% CO_2. Also the sensor operates at room temperature and requires little energy or expensive materials.

Hypothesis:

The best among the air purifier plants are the Bamboo palm (Chamaedorea elegans), Peace Lilly (Spathiphyllum), Money plant (Epipremnum aureum) and Mother in law tongue (Sansevieria trifasciata). Mother in law tongue plant stands best among the comparative study.

Questioning:

1. What are the commonly available air purifying plants?
2. Which plant is most effective at reducing the Carbondioxide content around it?
3. How can the CO2 content be measured?

Instrumentation and Experimentation

Materials

- Air Purifing plants
    - Bamboo Palm
    - Money Plant
    - Mother in law tongue
    - Peace lilly
- Glass aquariums with lids
- Dipropylamine
- Glass beakers
- Syringes and thin pipes.

Procedure:

1. Four air purifying plants are selected based on their characteristics
    a. Money Plant
    b. Bamboo Palm
    c. Mother in law Tongue
    d. Peace Lilly
2. The plants were bought and kept under desired conditions.
3. Each plant is kept in a glass aquarium with lid of equal size to maintain equal amount of air.
4. Four beakers were arranged with equal amounts of water in them.
5. The air conditions were examined for CO_2 by extracting the air from each container and injecting it in to the water contained in the respective beaker(a,b,c,d) with the help of a syringe and a thin transparent pipe.
6. To examine the content of CO_2, Dipropylamine was added to each beaker to check the flourosence light intensity.
7. The less the flourosence in the beaker the less is the carbondioxide content.

Results and Discussions

Results :

- The fluoroscence intensity was observed to be minimum in the glass beaker containing the air extract of Mother in law tongue plant.

Conclusions and Future work:

- I conclude that Mother in law tongue plant provides the best air purification. The low level of Carbondioxide in the air around the plant help in justifying the statement that it can prove to be a best indoor air purifying plant.
  Futher study can be carried out on the componenets of plant that help purifying the air around us.

ABBREVIATIONS

Airborne diseases: The diseases caused the organism with air as carrier.
Dipropylamine: The organic chemical used to create fluorosence in the carbondioxide solution.
Fluorosence: The light intensity observed in the solution after adding the organic solvent.

References

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