

Project Report
On
The Study of Efficiency of Indoor Plants
in Reduction of Small Particulate

Submitted by

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The name of the project : The Study of Efficiency of Indoor Plants in Reduction of Small Particulate

Type of the project : Experiment Research Project

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Abstract

This study aim to study about how the plant can help in reducing the amount of small particulate matter. What does the process that the plants use to purify the air? Our method occurred in a clear plastic box. We put the plant inside the box and injected incense smoke.

Finally, we hope that this project will be able to work for the intended objectives and provide useful information to people who interested in this research.

CHAPTER I INTRODUCTION

BACKGROUND OF THE STUDY

Particles up to 10 microns (PM10) are dust with a diameter of not more than 10 microns caused by combustion of fuel, burning in the open air, industrial processes and burning incense. When we breathe in, it can accumulate in the respiratory system which causes various health problems. These are mixed with the air in our home. Therefore, it is extremely important that we make the air around us better. Some plants can help us. Plants are known to absorb toxins through the process of dehydration. We intend to create a project **“The Study of Efficiency of Indoor Plants in Reduction of Small Particulate.”**

OBJECTIVE

This study has objective to study the “Reduction of small particulate matter less than 10 microns in the air.” The small particulate matter affects both short and long term health. Therefore, this study aimed to reduce the small particulate matter by using indoor plants.

PROBLEMS

This study would like to answer the following questions:

- a. Studies about the possibilities of plants for air purification.
- b. Which plant has the highest ability to reduce the amount of small particulate matter?
- c. What does the process that plants use to purify the air?

SIGNIFICANCE OF THE STUDY

Indoor Plants improve the fresh air as well as lower small particulate matter levels, suggesting a positive effect on the health of residents.

HYPOTHESIS

Plants can purify the air by reducing the amount of small particulate matter less than 10 microns in the air generated by incense smoke which different plants have the different abilities.

DEFINITION OF TERMS

- **PM10** is the particulate matter with an aerodynamic diameter of up to 10 μm .

- **Peace lily**

Scientific name : *Spathiphyllum cannifolium* (Dryand.) Schott

Description : A small bush with underground rhizomes, tillering and clear latex.

- **Chinese evergreen**

Scientific name : *Aglaonema* spp. and hybrid

Description :

- **Monstera**

Scientific name : *Monstera deliciosa* Liebm

Description : A perennial evergreen tree. It has large, porous leaves on thick plant stems.

- **Snake plant**

Scientific name : *Dracaena trifasciata*

Description : The leaves are thick and the ends are slender, smooth edges, dark green to. There is a light green stripe across the length of the leaf.

CHAPTER II

RESEARCH

I. A Study of Interior Landscape Plants for Indoor Air Pollution Abatement(NASA)

In this study, the leaves, roots, soil, and associated microorganisms of plants have been evaluated as a possible means of reducing indoor air pollutants. Additionally, a novel approach of using plant systems for removing high concentrations of indoor air pollutants such as cigarette smoke, organic solvents, and possibly radon has been designed from this work. This air filter design combines plants with an activated carbon filter. The rationale for this design, which evolved from wastewater treatment studies, is based on moving large volumes of contaminated air through an activated carbon bed where smoke, organic chemicals, pathogenic microorganisms (if present), and possibly radon are absorbed by the carbon filter. Plant roots and their associated microorganisms then destroy the pathogenic viruses, bacteria, and the organic chemicals, eventually converting all of these air pollutants into new plant tissue. It is believed that the decayed radon products would be taken up the plant roots and retained in the plant tissue.

II. Assessing the ability of ornamental plants to filter microscopic particles indoors. (Chiangmai University)

From the ability to capture small particles, it was found that the leaf area affected the ability to filter PM_{2.5} increases, including the appearance of the leaves. The leaves of an artificial fern with wrinkled surface have more trapping ability than the smooth, wide leaf. In addition, the dehydration of the hermit mixed plants resulted in the deterioration capacity reduced to zero. Therefore, the cultivation of ornamental plants within the building is used. For decoration Ornamental plants are also capable of trapping PM_{2.5}, but it takes a long time to reduce PM_{2.5} concentrations compared to using an air purifier. Therefore, using decorative plants to trap dust inside the building. Therefore, in conjunction with the use of other control methods such as pollution control at the source.

III. A comparative study of the dust holding capacity of Ivy

The test results showed that “Soi Inthanin plant” captures the most dust at 63.37% while the growth of the plant has 43.85% leaf cover due to the large leaf area, the rough and hairy leaf surface. Causing a lot of friction makes it possible to trap dust well. As for the gourd trees and the Chan Krang Fah trees, they have the ability to trap dust. The dust collection percentage was 57.89 and 66.27, respectively, which was close to 54.12 and 60.76 percent of leaf cover area, respectively. Another observation that confirms the dust trapping ability of the ivy plant. Then found that after experiments when dust has settled on plant leaves. When watering the leaves, plants were found. The dust that attaches to the plant leaves will be washed as well. The diffusion of dust is less, along with the dust that will harm the stomata of the plant will also be washed away.

IV. Pollution treatment by plants Phytoremediation

Using plants to treat pollutants by applying the principles of natural therapy mechanized treatment of the biological processes that occur by plants transport the pollutants into the stem from the roots through the vascular ducts. And a mechanism for treating pollutants within the plant. The incoming pollutants will change. The structures are in such a way that they are harmless for transport, especially those critical to photosynthesis. The treated pollutants have a lower toxicity, the least dangerous. Until the level is not toxic to plants and living things in the ecosystems at present, plants are used to treat water pollution. Soil and air, which can be treated both Organic and inorganic substances, including heavy metals such as arsenic, lead, mercury, cadmium, nickel, ring or linear hydrocarbons.

V. Potential of a Small Indoor Plant on the Desk for Reducing Office Workers' Stress

The objective of this study was to verify the stress reduction effects of the presence of small indoor plants on employees in a real office setting. We investigated the changes in psychological and physiological stress before and after placing a plant on a worker's desk. There were two phases of the study: a control period without plants and an intervention period when the participants were able to see and care for a small plant. Our study indicates that having opportunities to gaze intentionally at nearby plants on a daily basis in the work environment can reduce the psychological and physiological stress of office workers.

CHAPTER III

METHODOLOGY

Material

- 1) 4 types of indoor plants
 - Peace lily
 - Chinese evergreen
 - Monstera
 - Snake plant
- 2) A Clear plastic box
- 3) Incenses
- 4) Tape
- 5) Particular counter



Testing methods

- 1) The first step begins by taking a box without the plant but put the incense smoke to measure the amount of dust.
- 2) The box with plant are inside. And then the box is sealed and a mixture of smoke injected into it.
- 3) Experiment in number 2 was performed with the remaining four plants.
- 4) From starting to measure the amount of dust in the period of 30 minutes, 1.30 hour, 2.30 hours, 5 hours, 9 hours, 11 hours, 13 hours, 15 hours, 19 hours, and 24 hours
- 5) Finally, the measured dust amount was used to make a graph to compare the dust filtration efficiency of all 5 types of plants.

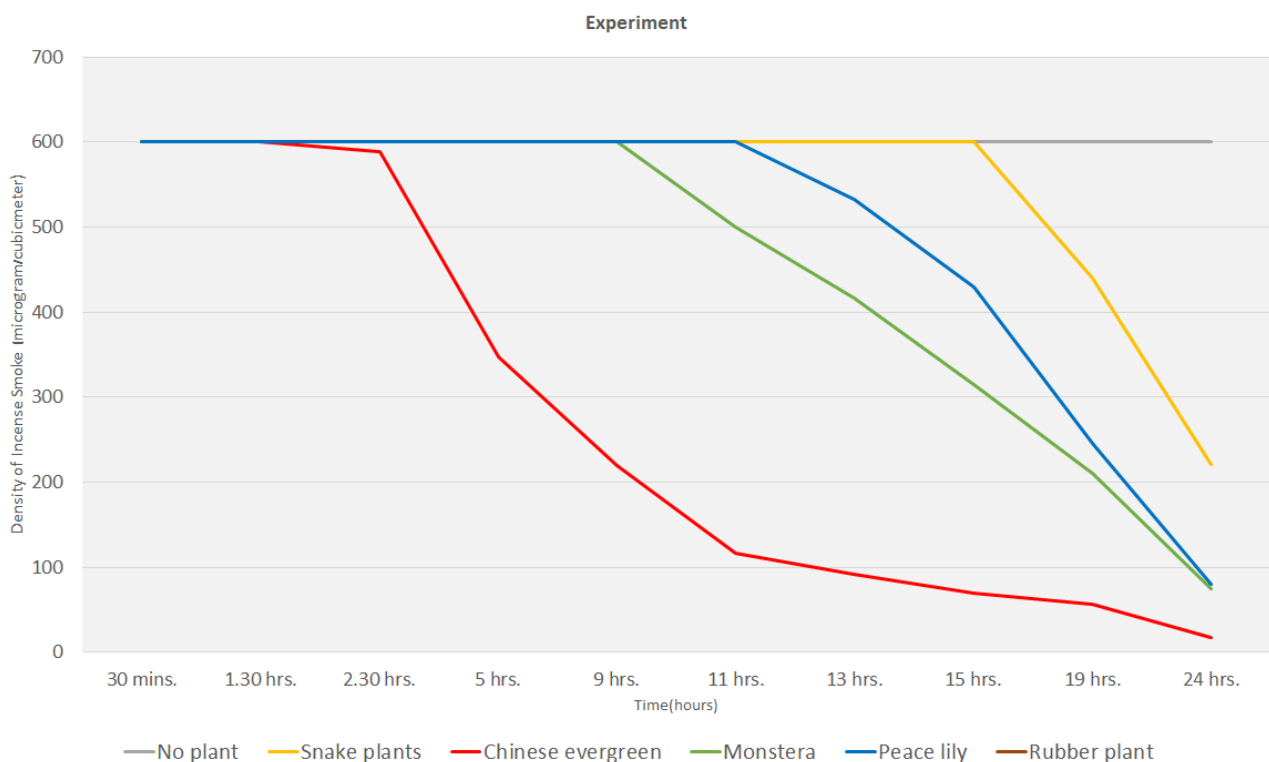
CHAPTER IV

RESEARCH FINDINGS AND DISCUSSION

Findings

Based on the successful results on air purification of 4 plants in clear plastic box experiments, we made the step to air purification in clear plastic box. The presence of plants decreased the concentration of incense smoke as well as contaminants like dust. Below the research findings will be reported for the volume of incense smoke and the number of time records.

Time	30 mins.	1.30 hrs.	2.30 hrs.	5 hrs.	9 hrs.	11 hrs.	13 hrs.	15 hrs.	19 hrs.	24 hrs.
plants										
No Plant	600	600	600	600	600	600	600	600	600	600
Snake plants	600	600	600	600	600	600	600	600	440	221
Chinese evergreen	600	600	589	347	219	116	91	70	57	17
Monstera	600	600	600	600	600	500	417	314	210	75
Peace lily	600	600	600	600	600	600	532	429	245	80



Conclusion of the experiments

From our conclusion, after burning the incense without the plant inside the clear plastic box, the result showed that the volume of incense smoke was constantly at 600 microns. After that, when we put the plants down in the box. The result showed that the volume of incense smoke decreased gradually, which differed depending on the types of plant. Chinese evergreen can reduce the amount of incense smoke as much as 17 microns. This plant is the best purifying plant from our experiment and followed by Monstera, Peace lily, and Snake plants which the volume of incense smoke value at 75, 80, and 221 microns, respectively. The results of the experiments show that having plants during smoke generation can effectively reduce the amount of incense smoke.

CHAPTER V

RECOMMENDATION AND REFLECTION

RECOMMENDATION

To help improve the research on **“The Study of Efficiency of Indoor Plants in Reduction of Small Particulate”**, the following recommendations are proposed:

- Further studies : The study of bacteria present in the soil that contributes to the process of reducing the amount of small particulate matter.
- Further applications : Study of the differences between the small particulate matter reduction of leafy plants and the leafless plants.

REFLECTION

This study had shown us that some indoor plants have the ability to abate the small particulate matter in the air. This is the other way for decreasing the amount of small particulate matter and increasing green space area in your home.

REFERENCE

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