IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
Impact Factor: 5.731
Volume 2, Issue 7, January 2022

Role of Houseplants in Air Purification

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Abstract: *Emergence of environmental issues such as air pollution has greatly required the need for robust, cheap, operationally adaptable, and smart monitoring systems. The proposed work describes a study of how the household plants are helpful in purifying the environment. Air pollution monitoring system has been developed using Wireless Sensor Network (WSN)*

Keywords: environmental issues

I. INTRODUCTION

Air pollution is a major environmental concern in most major cities. As society grew more civilized and industrialized, contamination of the air increased a lot and contributed to the pollution of the atmosphere. Thousands of activities contribute to the overload of air pollution. Volcanoes, decaying plants and animals and dust are natural sources of pollution. Thus air quality has a huge impact on different aspects of life quality and therefore air quality improvement is important.

Poor indoor air quality has been linked to many health related issues especial ly in children. Allergy and asthma are to be considered as the most common chronic disease in urban dwelling children.

Air filtration could be the use of houseplants. Trees and other vegetation absorb pollutants and play large role in cleansing the atmosphere. Trees are an important, cost effective solution to reducing pollution and improving air quality In addition to basic photosynthesis that removes carbon dioxide and returns oxygen to air, plants can remove toxicants/impurities from air, soil and water in at least two ways. First, they can metabolize some toxic chemicals, releasing harmless by-products; secondly they can incorporate toxicants, such as heavy metals into plant tissues, thus sequestering them.

Trees and plants provide many benefits, including the ability to condition the atmospheric environment. In addition to regulating temperature, humidity and air movement, trees interact with air pollutants in various ways. Some trees are injured by gases and particles in the air, while others absorb and use contaminants without apparent harm. Trees also reduce pollution by actively removing it from the atmosphere. Leaf stomata, the pores on the leaf surface, takes in polluting gases which are the absorbed by water inside the leaf. Many researchers already studied that trees remove carbon monoxide (CO), sulpher dioxide (SO2), nitrogen dioxide (NO2) and ozon from air. In this work, we have tried to understand the complex interactions between plants and the atmosphere. In closed controlled environment, we were monitoring the concentration level of oxygen (O2) and carbon dioxide (CO2), light, temperature and humidity.

Trees may absorb some pollutants in the natural life processes common to all plants. In an exchange of gases, plants take in carbon dioxide, convert it to food and release oxygen. This exchange occurs through stomata or pores on the leaf's surface. During normal opening of theses pores, other elements may also enter. These include pollutants such as chlorine, sulphur dioxide and fluorides. The plant uses some of these materials as food, and releases others into the air or soil. In this way, plants receive nutrition and possibly help to purify the air as well. The overall pattern of leaves—their number, arrangement, and density, as well as the closeness and configuration of trees, may affect trees ability to reduce the level of air pollution. A sparse canopy, for instance, has less potential for cleansing than a big, thick canopy .

For studying some houseplants that have the ability to naturally improve the air quality of our home, all of these indoor houseplants were analyzed. They found that each had a unique way to naturally cleanse the air of toxins that have a negative effect on our health.

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Selection of Plants

In proposed work the plants which are used are:

Tulsi (Ocimum sanctum or Holy basil):

Tulsi gives out oxygen for 20 hours a day along with the formation of nascent oxygen. It absorbs harmful gases like, carbon dioxide, carbon monoxide and sulphur dioxide from the environment.

Devil's Ivy (Epipremnumaureum):

With evergreen vines and small green heart shaped leaves is quite efficient at cleansing the air pollutants such as benzene, trichloroethylene, xylene, formaldehyde and keeping air fresh with giving oxygen

Snake Plant (Sansevieria trifasciata):

Often referred to as Snake plant or Mother-in-Law Tongue. This evergreen perennial plant is another houseplant that is known to improve indoor air quality. It is one of the best houseplants for absorbing airborne toxins, including formaldehyde, nitrogen oxide, benzene, xylene and trichloroethylene. It converts a lot of CO_2 to O_2 at night, making it ideal to have several in room. 6-8 waist high plants are needed per person to survive if there is no air flow. Since they don't need a lot of light or water to survive, snake plant is easy choice for any corner of your home.

Aloe Vera:

Aloe Vera emits oxygen at night and increases the longevity of your life. It is almost a "no-maintenance" plant and caters to a lot of beauty benefits too.

Orchids:

Beautiful and beneficial, orchids are a perfect choice to be settled in the corner of room. Apart from emitting oxygen during the nighttime, Orchids also banish xylene—pollutant found in paints, and fills the room with fresh air to breathe.

Rubber Plant:

Rubber plants excel at removing chemical toxins from indoor air, requiring less light than many other plants and outperforming all other ficuses.

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English Ivy (Hedera helix):
Popular houseplant that helps filter airborne toxins inside your home. English Ivy is effective at cleansing benzene, formaldehyde, xylene and toluene from the air. It also helps to reduce mold.

Lady Palm:
Lady Palm can be kept in dry or humid climates and is fiercely resistant to most types of plant insects.

Peace Lily (Spathiphyllum):
It gives oxygen at less light also and reduces the carbon dioxide level and purifies the air. They require very little light or water to remain healthy. NASA analysis of indoor houseplants revealed that the Piece Lily was the most efficient at removing airborne Volatile Organic Compound, including formaldehyde, trichloroethylene and benzene. Simply put in dark corner, give it water once a week and this little plant will help purify the air around that general area.

II. CONCLUSION

The impact of tree cover area/non tree cover area on air pollution is co-related with due consideration of CO2 depletion and O2 emission concentration. Indoor plants are an excellent natural solution for improving the air quality in your home. Not only can they remove harmful toxins and pollutants, but they can also provide a sense of calm and improve your overall quality of life. So, why not bring some greenery into your indoor spaces and breathe easy with the help of indoor plants.

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