



HOUSE PLANTS COMBATING INDOOR POLLUTION AND RELIEVING SICK BUILDING SYNDROME

MRS. MADHULIKA PARMAR ¹

¹ ASSISTANT PROFESSOR, GOVT. GIRLS COLLEGE, SADULSHAHAR (SRI GANGANAGAR).

ABSTRACT:

In most of the urban dwellers, there is dearth of greenery and open spaces resulting in continuous confinement of people indoors without any access to greenery leading to Sick Building Syndrome. The increased energy efficiency of newer buildings with substantially reduced air exchange rates often results in an increase in the concentration of indoor air pollutants. NASA studies have found that indoor air pollution average 2-5 times higher than outdoors. The average person spends nearly 90% of his time inside, predominantly in homes, offices and schools and thus is refrained from exposure to a natural environment that is physically and mentally healthy. So, one has a smart choice to create a personal breathing zone by growing plants indoor. Researchers show that the air in plant-filled green rooms contains 50-60% fewer airborne moulds and bacteria compared to its equivalent. House planting can serve as the most efficient way to decrease the degree of SBS symptoms as well as to regulate indoor air quality. Further regardless of the design and style, house plants blend seamlessly in every indoor setting. In recent years, house plants have become increasingly popular for interior decoration as well.

This review highlights the hazardous impacts of indoor air pollution to which most of the urban citizens are exposed, degrading their quality of life by making them physically and mentally disturbed which has been linked to Sick Building Syndrome. This paper also draws our attention towards a way of getting rid of this problem and the solution is to GO GREEN AND NATURAL. The benefits of the indoor plants are of great importance for indoor environment quality. Indoor plants help in purifying air, deter illness, ease tension, create a relaxed and happy atmosphere leading to work better through improved concentration, enhanced creativity, increased productivity and enriched overall well-being.

KEYWORDS:

HOUSE PLANTS, INDOOR AIR POLLUTION, INDOOR AIR QUALITY, SICK BUILDING SYNDROME, INDOOR PLANTS.

PAPER ACCEPTED DATE:

27th September 2024

PAPER PUBLISHED DATE:

30th September 2024

INTRODUCTION

The unexplainable beauty of different formal and informal types of garden shows the love of man towards nature since time immemorial. House plants have been known as a part of human existence since 10,000 B.C. Nature did not create indoor plants, humans did this by taking plants that thrive in nature and bringing them indoors, where these plants have become an integral part of our lives. Usually indoor plants are chosen for their ability to tolerate particular indoor conditions such as low light, high temperature and low humidity. But, nowadays rapid urbanization, increase in vertical size of buildings, increase pollution from vehicles and factories, shrinkage of green cover makes it necessary to have greener environment both indoors and outdoors.

People today spend 80-90% of their time indoors and are thus alienating themselves from nature and limiting the opportunities to get exposed to the nature. So, in regard to this confinement of people within the four walls of the buildings, people have an increased concern about indoor air quality (Lim *et al.*, 2006). The indoor air in urban areas

is reported to be much more polluted than outdoors (Yang *et al.*, 2004). It was reported that over 300 volatile organic compounds such as benzene, toluene, ethylbenzene, and xylene (BTEX) (Craighead, 1995; Sullivan *et al.*, 2001; Wolkoff, 2002) and toxic chemical substances like formaldehyde have been identified as indoor contaminants in addition to dust and inorganic gases. These volatile organic compounds (VOCs) are regarded as the most important pollutants of indoor air. The indoor air pollutants originate from both living and inanimate objects within the dwelling and in some cases, diffuse into the building from the exterior and collectively, these pollutants result in a significant reduction in indoor air quality affecting the health, well-being and quality of life of those exposed to it. Hence, indoor air quality of any building is a basic determinant of healthy, overall well-being, comfort and productivity of the respondents. A study conducted by EPA states that indoor air pollution is among the top five environmental health risks. In 2009, the World Health Organization (WHO) prepared a report on 'Global Health Risks: Mortality and Burden of Disease

Attributable to Selected Major Risks' stating that indoor air pollution is responsible for 2.7% of the global burden of disease. In 2012, indoor air pollution was linked to 4.3 million deaths globally, compared to 3.7 million outdoor air pollution. The deterioration of indoor air quality can result in "multiple chemical sensitivity, new house syndrome and sick building syndrome" (Shinohara *et al.*, 2004).

SICK BUILDING SYNDROME- A SERIOUS HEALTH ISSUE AFFECTING PEOPLE'S WELL-BEING

Sick Building Syndrome is described as a situation in which building occupants experience acute health problems and comfort effects that appear to be linked to time spent in a building, but no specific illness or cause can be identified. The complaints may be localized in particular room or zone or may be widespread throughout the building. The symptoms may include headache, dizziness, anxiety, insomnia, nausea, aches and pains, fatigue, poor concentration, shortage of breath or chest tightness, eye and throat irritation, etc. According to a World Health Organization working group (WHO, 1983), SBS symptoms can be divided into symptoms related to the mucous membranes (i.e. the eyes, nose and throat), dry skin, headache and lethargy. These symptoms are temporarily related to working in or occupying a particular building. Although these symptoms improve within couple of hours after leaving the building, but this could decrease job satisfaction, work productivity and cause economic losses (Seppanen and Fisk, 2006).

HOUSE PLANTS FOR RELIEVING SICK BUILDING SYNDROME

To improve their living and work spaces, people plants indoors as plants serve as the symbol of nature and bringing nature indoor is the best possible way to get rid of this problem. Although, technology advancements for improving indoor air quality are going on (e.g., electronic filtering systems); however, these are often expensive and not widely used. So, biological methods, such as use of plants are increasingly being used. Plants are known to absorb air pollutants via their stomata during normal gas exchange. Several pollutants have been shown to be sequestered or degraded in situ or after transfer to other locations having plants (Schmitz *et al.*, 2000). Some major air pollutants are also removed by absorption or adsorption to the plant surface, microorganisms or soil particles (Orwell *et al.*, 2004). In addition, indoor plants consume little energy, absorb carbon dioxide, decelerate global warming, and contribute to ecological diversity. Thus, they contribute to both public health and sustainable development. Planting beautiful and aesthetic looking indoor plants not only has a picturesque effect but also purifies the surrounding air and give a relaxing feeling. Awaking fresh not only sparkles the morning but also makes the whole day good.

National Aeronautics and Space Administration (NASA) has conducted research on various plants that will better sleep by removing the intoxicants like formaldehyde,

benzene, neutralizing the moulds and microbes, increasing the content of oxygen and providing sweet smell which has soothing effect on mind to induce sleep. Several indoor plant species for example, *Spathiphyllum willisii*, *Dracaena deremensis* and *Kalanchoe blossfeldiana* can effectively remove benzene while *Chrysalidocarpus lutescens* and *Phoenix roebelenii* can readily remove toluene and xylene. Instead of using sweet smelling chemicals in homes, it is far much better to go natural.

Benefits of indoor plants

1. Energy healing potency
2. Provides healthy indoor environment
3. Psychological benefits
4. Prevent allergies by removing allergens
5. Spiritual aspects
6. Increases work efficiency of employees
7. Beneficial effects on children
8. Helps in improving health of patients
9. Absorbs noise
10. Increases humidity of surrounding air
11. Cooling effect
12. Aesthetic and economic values

Plants for a better sleep:

NASA (National Aeronautics and Space Administration) has recommended various plants to decorate bedroom to have a sound sleep (<http://youtu.be>). Some of these are:

- Jasmine: It is having gentle and soothing effect on mind.
- Lavender (*Lavandula*): The scent of lavender slows down heart rate, reduces blood pressure and lowers down mental stress. It also reduces crying in babies and put them to deep sleep.
- Snake plant (*Sansevieria trifasciata*): It improves air quality by filtering certain toxins like formaldehyde, benzene. It also takes out CO₂ and increases O₂ content and requires no extra care.
- Aloe vera: It gives O₂ during night. NASA reported that it is the best plant for improving air quality. It requires more sunlight, so should be placed near window.
- Gardenia: It reduces stress but a little bit difficult to manage. It should not be placed in direct sunlight but on bright light.
- Spider plant (*Chlorophytum comosum*): NASA reported that spider plant cleans 90% of carcinogenic formaldehyde fumes and bad odours.
- English ivy (*Hedera helix*): It reduces allergy and asthma and also reduces 78% of air borne moulds within 12 hours. It requires moderate sunlight and should be placed in hanging baskets as its leaves are poisonous to children and pets.

- Peace lily (*Spathiphyllum wallisii*): It removes intoxicants and increases humidity by 5%. NASA called this plant as 'superstar'. It also neutralizes air borne microbes.
- Gerbera daisies: It has beautiful and colourful flowers and prevents allergy.
- Golden pathos (*Epipremnum aureum*): It is also known to remove intoxicants but is poisonous so should be placed out of reach of children and pets.

CONCLUSION

As people spend most of their time indoors, they are faced with increasingly severe physical and mental health and wellbeing problems due to poor indoor air quality. The quality of indoor air is degraded by the emission of several indoor air pollutants which have a detrimental effect on mental fitness, job satisfaction, work productivity and overall well-being. Sick building syndrome is a serious health issue in this modern urbanized world affecting the people confined in their four walls of the house. This is not only a matter of public health but also of economic, societal, and environmental sustainability. The most effective way for solving this problem is to come close to the nature by bringing nature indoor. The use of indoor plants for removing the dearth of greenery deserves attention. House plants not only purifies indoor air by degrading indoor pollutants but also helps in relieving sick building syndrome, lowers stress and tension and creates a healthy, peaceful and happy ambience leading to enriched overall well-being.

REFERENCES

1. Lim, Y. W., Yang, J. Y., Kim, H. H., Lee, Y. G., Kim, Y. S., Jang, S. K., Son, J. R., Roh, Y. M., and Shin, D. C., 2006, "Health risk assessment in terms of VOC at newly built apartment house," J. Kor. Soc. Indoor Environ., 3, pp. 211-223.
2. Yang, X., J. Srebric, X. Li. and G. He. 2004. Performance of three air distribution systems in VOC removal from an area source. Building Environ. 39: 1289-1299.
3. Craighead, J. E., 1995, "Indoor air quality and pollution," In: Craighead, J. E. (ed.). Pathology of Environmental and Occupational Disease. Mosby Year Book, St. Louis, pp. 29-39.
4. Sullivan Jr., J. B., Van Ert, M. D., Krieger, G. R., and Brooks, B. O., 2001, "Indoor environmental quality and health. In: J. B. Sullivan Jr. and G. R. Krieger (eds.). Clinical environmental health and toxic exposures (2nd ed., p)," Lippincott Williams & Wilkins, a Walter Kluwer Co., Philadelphia, PA, USA, pp. 669-704.
5. Wolkoff, P., 2003, "Trends in Europe to reduce the indoor air pollution of VOCs," Indoor Air 13 (6), pp. 5-11.
6. World Health Organization. (2009). Global health risks : mortality and burden of disease attributable to selected major risks. World Health Organization.
7. Shinohara, N., Mizukoshi, A., and Yangisawa, Y, 2004, "Identification of responsible volatile chemicals that induce hypersensitive reactions to multiple chemical sensitivity patients," J. Expo. Anal. Environ. Epidemiol, 14, pp. 84-91.
8. WHO (1983), "Indoor Pollutants: Exposure and Health Effects," Report of a WHO Meeting, World Health Organization Regional Office for Europe, Copenhagen.
9. Seppanen, O., and Fisk, W.J. (2006), "A procedure to estimate the cost-effectiveness of the indoor environment improvements in office work", in Clements-Croome, D. (Ed.), Creating the Productive Workplace, Taylor & Francis, London.
10. Schmitz, H., Hilgers, U., and Weidner, M., 2000, "Assimilation and metabolism of formaldehyde by leaves appear unlikely to be of value for indoor air purification," New Phytol, 147(2), pp. 307-315.
11. Orwell, R. L., Wood, R. A., Burchett, M. D., Tarran, J., and Torpy, F., 2006, "The Potted-Plant Microcosm Substantially Reduces Indoor Air VOC Pollution: II. Laboratory Study, Water, Air, Soil Pollution," 177, pp. 59-80.
12. <http://youtu.be/2PNG7iFgf2c>/9 Sep 2019.