

# **Vegetation Concept in Interior Space Design as Sick Building Syndrome Solution**

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**Abstract.** Sick building syndrome is a thing that happens in the area of interior architecture. Specifically, issues with user activity that are caused by health issues and discomfort in spaces caused by poor air quality in buildings. There is a remedy for this issue that may also be used to post-pandemic space planning. Applying the idea of vegetation to the design of space is one option. The purpose of this study is to describe the idea of using plants in interior spaces, which will impact how comfortable a user's workspace is. A qualitative descriptive research method based on the biophilic design theory will be used for this study. The findings of this study should serve as a guide for interior architects as they incorporate the idea of plants into spatial design to combat sick building syndrome. The characters and plant life that are used in interior design are those that can effectively absorb toxins and enhance air quality.

## **1. Introduction**

Sick Building Syndrome (SBS) is a condition in which residents of a building feel acute health and well-being impacts due to time spent in the building without being able to pinpoint an underlying sickness or cause. SBS symptoms can include headaches, eye, nose, or throat irritation, dry coughs, dry or itchy skin, dizziness, nausea, trouble focusing, and exhaustion. These symptoms can also appear separately or in combination. Although the exact etiology of SBS is still unknown, indoor air pollution is the main culprit behind the majority of problems that result from its onset. The physical surroundings of the space, such as external elements, interior materials, and activities that take place there, are what cause the pollution. In addition to the aforementioned environmental factors, it has been discovered that complaints of Sick Building Syndrome are also influenced by factors outside the immediate environment, such as psychological issues and work-related issues that are thought to influence an individual's susceptibility to Sick Building Syndrome (1). Applying the idea of vegetation to the room is one way to get around SBS. By choosing plants that are suited to the space's requirements and the plant's character, vegetation is the idea of incorporating plant products into spatial layout. One of the design components that embodies the idea of a healing environment is vegetation (plants). The healing environment is a therapeutic setting that blends elements of nature, the senses, and psychology (2). A psychological ailment is one that affects mood, behavior, and can lead to eating disorders or trauma-related problems.

Humans, in the words of Charles O. Wilson, are bio-philiacs (lovers of life) (3). As a result, by connecting with nature, people will experience feelings of joy, companionship, and love. Reduced negative feelings. Walking through parks and woods or planting trees are two ways to engage with nature. The term "greenery concept" is another way of referring to the vegetation that is part of the spatial concept. Plants and greening systems are crucial components of interior design and construction

(4). Users of space may feel physically and mentally more comfortable when there is flora or plants around (5).

This study's goal is to describe the concept of employing plants in interior spaces, which will affect how comfortable a user's office is. that exposure to nature can reduce the negative emotions brought on by stress and the activation of the autonomic nerve system (6). Inorganic gases, VOCs, dust, and other airborne contaminants can all be significantly reduced by "indoor" potted plants, according to a growing body of research (7).

This study will employ a biophilic theory-based qualitative descriptive research methodology. The topic of incorporating natural elements into a space is included in biophilic design. The Biophilic idea is believed to users' physical and mental health. The results of this study are anticipated to be used as a guide by interior designers when creating spaces as a remedy for the sick building syndrome issue. The idea of including vegetation in the interior design is to ensure that chosen plant are suitable for the available space. Not just in terms of the aesthetic value of plants as a design element, but also in terms of the advantages that these plants and vegetation bring to a space.

## 2. Methodology

This study employed a qualitative method with the following stages:

1. A review of the literature on sick building syndrome and different kinds of plants for the environment
2. Field observations, which allow you to see the different plant species and how they are used in space
3. Examining several plant species to combat sick building syndrome.

The United States Occupational Health and Safety Agency, or NIOSH, found that there are six main sources of air pollution inside buildings, including the following (8) :

1. Inadequate ventilation can result in 52% of pollutants, resulting in uneven air distribution, a lack of fresh air entering the building, or poorly maintained ventilation facilities.
2. By 17%, indoor instruments like copiers, tissue paper, paper glue, and wallpaper adhesive, as well as floor cleaners and air fresheners, contribute to air pollution.
3. Because of an 11% error in the place where fresh air enters the room, pollution from outside the building can also enter.
4. Formaldehyde, glue, asbestos, fiberglass, and other materials that are used to construct the structure can all be contaminated to a certain extent (3%), as can other elements like asbestos.
5. By 5%, bacteria, fungi, protozoa, and other microbial products can be found in air ducts, coolers, and their complete systems, causing contamination.
6. 12% from unauthorized sources

Sick Building Syndrome is becoming more common, and a number of factors contribute to this (9).

### a. Individual elements

Paper dust, cigarette smoke, indoor dust, and computer use are the first three factors.

### b. Building component

- 1) The environment is warm (more than 23°C in air-conditioned room).
- 2) Insufficient indoor airflow (10L/s/person)
- 3) Climate control in the home.
- 4) Limited ability to alter lighting and temperature.
- 5) The building requires little upkeep and is kept tidy.
- 6) Deterioration of the water network.

## 3. Results and Discussion

Two approaches are used to apply the concept of vegetation:

### 1. An exterior landscaping idea

Choosing outdoor plant species that have positively impact on soil nutrients and the surrounding environment is important when considering the idea of external planting. It is advised to use the strategy shown in Figure 1 below for planting positions:

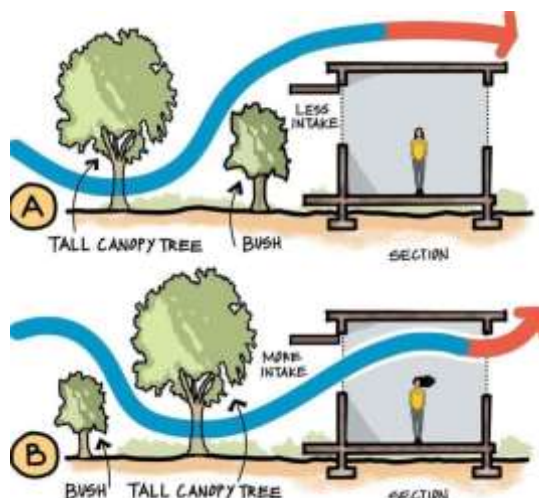




Figure 1. Planting Concept for Exterior










In Figure 1, position B is better for the room's air circulation (with good opening directions).

## 2. The idea of indoor plants




Here are some plant varieties (sample) that are suitable for usage indoors (Table1):

Table 1. Types of Indoor Plants

No	Plants Name	Image	Characteristics	Growing Plant	Note
1	Sansevieria		The leaves have a rough feel, grow upright around the parent plant on tillers, do not have stems, bloom, and produce seeds.	It can thrive in a variety of temperature ranges with or without lighting, grow in low-fertility culture, and withstand dry media.	A 20m <sup>2</sup> (10) room with one adult Sansevieria's plant and four to five leaves can be made to smell better. Trichlorethylene, formaldehyde, toluene, benzene, and xylene are among the chemicals it can absorb.
2	Dolar Plant		Symmetrical, thick leaves	Does not call for consuming a lot of water	According to Petal Republic, research from NASA demonstrates that plants serve as air filters, removing everything from traces of dangerous substances in the air to the toxic content of cigarette smoke.

3	Monstera Deliciosa		The leaves are thick and broad.	Does not necessitate consuming a lot of water	Maintains the room's humidity while purifying the air.
4	Coffee Plant		The leaf bones are solid and the leaves are not overly broad.	Easy maintenance	Can be utilized as a natural scent in space
5	Aglonema		Its leaves come in a range of hues.	Able to flourish in low, medium, and high light	Beautiful in appearance
6	Rubber plant		Thick and sturdy leaves	Easy maintenance	Adequate dust absorber
7	Pilea		It has little leaves and contains water.	Needs the appropriate amount of water	Improve indoor air quality
8	Peace Lily		Strong and pinnate leaf bones	Easy maintenance	Capable of removing hazardous chemicals and poisons from the air in space and cleaning it
9	Hebras		Little leaves and blossom production	Needs the appropriate amount of water	Toxic absorber
10	Epipremnum Aureum		Thick leaves	Easy maintenance	Absorbs formaldehyde and formalin from the air in the house and is toxic in the room.
11	Chrysanthemum		Little leaves and blossom production	Needs the appropriate amount of water	Capable of absorbing a variety of toxic chemicals, including benzene, formalin, ammonia, and xylene.




12	English ivy		The little leaves have a poisonous sap in them.	Easy maintenance	Able to filter 90% of the airborne fungus that cause allergies
13	Chlorophytum Comosum		The narrow, tiny leaves are tapering.	Easy maintenance	Can styrene and formalin-containing air absorb. A 200 square foot area can breathe easier with only one pot of paris lilies. can break down nicotine and benzene in tobacco.
14	Bromelia		The leaves are large, strong, and angular.	Needs the appropriate amount of water	Able to capture 90% of airborne toxins (one of which is benzene)

The positioning of plants in interior areas can be altered to meet demands based on some of the information gathered above. Examples of how to arrange indoor plants in pots or without them to create an indoor garden as shown in Figure 2 and 3:

<p>Need:</p> <ul style="list-style-type: none"> <li>- Planters (ceramic material, earthenware, plastic, glass, etc.)</li> <li>- Expanding media</li> <li>- Plant</li> </ul>	
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**Figure 2.** Indoor Plants Using Pot

<p>Need:</p> <ul style="list-style-type: none"> <li>- Planting space (wider media)</li> <li>- If necessary, flower pots made of ceramic, earthenware, plastic, glass, etc.</li> <li>- Growing medium</li> <li>- Plant</li> </ul>	
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**Figure 3.** Indoor Garden

Space users can decide which vegetation is good and appropriate to place in a room based on the description of the type and character of the plants above. The natural beauty of vegetation is advantageous in creating visuals in space.

#### 4. Conclusion

According to the justification provided, the choice of vegetation to address the issue of sick building syndrome is a kind of plant that is more beneficial for enhancing the quality of the area. The visual impact of plants will vary based on the tastes of the people using the room. If placed properly, plants will appear lovely. To maximize the benefits of plants, pick a variety that can meet the requirements of the surrounding area. One solution to the sick building syndrome issue is the idea of greenery. To determine the extent to which this idea has been successful in spatial design, in-depth observations will be made for future research.

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