

Green Plants to Improve the Quality of Indoor Environments

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It has been found that in urbanized society, people spend about 90% of their time indoors, separated from the air, soils, water, and natural surroundings of our ancestors. The quality of the indoor environment has, therefore, become a major issue in determining the health and well being of building occupants. Some connection with the “real” environment needs to be maintained or restored. It has been found, for example, that patients recover from surgery more rapidly when their hospital windows look onto planted landscapes. It is also well-known that buildings surrounded by beautiful gardens or scenery are more highly priced (i.e., valued by buyers and users) than those with no pleasant vistas.

Indoor plants can also make a substantial contribution to improving the indoor environment, which has yet to be fully realized by building designers, owners, and managers. They greatly assist in the aesthetics of the internal surroundings, provide more satisfactory surroundings for occupants, and can complement engineering approaches to office design and maintenance. They also appear to help stabilize humidity levels and clear dust from the air. These attributes will be considered in some detail. In addition, interior foliage plants can contribute significantly to improved air quality of the indoor environment. Outdoor air pollution is increasing annually, along with industrialization and vehicle use. However, indoor air pollution may be increasing even faster, with incoming air bringing in outdoor pollutants and the indoor environment producing its own as well. Trace amounts of over 300 volatile organic compounds (VOCS) can be found in indoor air, most of which are derived from furnishings, office chemicals, cleaning fluids, and the clothing and perfumes (deodorants, after-shave, etc.) of occupants. Where the ventilation rates from outside are minimized to save costs of temperature regulation, these pollutants become more concentrated. “Sick building syndrome” is more related to chemical exposure than to microorganisms in the air conditioning system (although they also play a role). The aim of our continuing project is to investigate the capacity of commonly used indoor plants to absorb VOCS and so improve indoor air quality. We are also interested to discover the mechanisms involved, so that breeding programs for improved plants can be undertaken. To date we have employed three species used commonly around the world in interior plantscaping, *Spathiphyllum* (peace lily), *Howea forsteriana* (Kentia palm,) and *Dracaena* (Compacta Group) ‘Janet Craig’. We have found that each species is capable of removing from 2 to 5 times the Worksafe Australia Time-Weighted Occupational Maximum concentrations of benzene and n-hexane, over a 24-h period. The primary agents of removal appear to be the microorganisms of the growth medium. The plant and soil thus form a microcosm for air pollution absorption. We are now investigating the soil flora for each species, using scanning electron microscopy and extending the range of VOCS and plant species used, working towards being able to recommend best species and best densities of plantings for indoor air pollution reduction.