

Plants... An Elementary Answer to a Larger Problem

How Plants can help you Breathe Easier

By Pamela Nelly

We've all known since grade school that plants clean the air we breathe. And yet, the Environmental Protection Agency rates indoor air pollution among the world's top environmental health risks. With the average American spending 90% of their time indoors and with many facilities being unable to afford and maintain a system to control humidity and/or are forced to operate contaminated systems, Sick Building Syndrome has been on the rise.

Sick Building Syndrome develops into a serious and expensive liability when toxins found in fibers (carpet, fabric, wall coverings) and solvents (wallboard, paints, varnishes, furniture) become concentrated inside sealed office buildings. The result is a notable increase in employee illness (generally eyes, lung and upper respiratory problems as well as allergies, colds and viruses).

The National Aeronautics and Space Administration (NASA, Washington, DC) report's that the syndrome is widespread in energy-efficient buildings. The problem is that these sealed buildings have less exchange of fresh outdoor air for stale indoor air. This causes higher concentrations of toxic chemicals in indoor environments, brought about by emissions from a great variety of building constituents. Their data confirms that energy-efficient, sealed office structures are often 10 times more polluted than the air outside!

The answer to the problem is elementary; one that we have known all along but have failed to implement until recently. Could it be as simple as plants?

Plants... the Lungs and Kidneys of a Building

Research shows that plant-filled rooms contain 50% to 60% fewer airborne molds and bacteria than rooms without plants. For almost 20 years, Dr. Billy C. Wolverton and his aids in the Environmental Research Laboratory of John C. Stennis Space Center (Picayune, Miss.) have been conducting innovative research employing natural biological processes for air purification. "We've found that plants can suck these chemicals out of the air," he says. "After some study, we've unraveled the mystery of how plants can act as the lungs and kidneys of these buildings." The plants clean contaminated office air in two ways. They absorb office pollutants into their leaves and transmit the toxins to their roots, where they are transformed into a source of food for the plant. In his book, *How to Grow Fresh Air: 50 Houseplants That Purify Your Home or Office* (Penguin, 1997), Dr. Wolverton details exactly how plants emit water vapors that create a pumping action to pull dirty air down around the roots, where it is once again converted into food for the plant.

Wolverton has found that plants are especially needed in office buildings in which Sick Building Syndrome is common. He goes so far as to suggest that everyone should have a plant on his or her desk, within what he calls the "personal breathing zone." This is an

area of six to eight cubic feet where you spend most of your working day. Jon Naar, author of *Design for A Livable Planet: How You Can Help Clean Up the Environment* (Harper & Row, 1990), suggests that 15 to 20 plants are enough to clean the air in a 1,500 square-foot area.

Tove Fjeld, a professor at the Agricultural University in Oslo, Norway, conducted a two-year study in an office found the following reductions in ailments after plants were introduced:

Ailment	%Reduction
Fatigue	20
Headache	45
Sore/dry throats	30
Coughs	40
Dry facial skin	25

Humidity Levels... Another Important Factor in Health

Plants not only control the toxin levels in the air, but also humidity. Interior plants are vital to maintaining the approved human comfort range for relative humidity in offices. A study conducted by Virginia Lohr, Ph.D., at Washington State University determined that when plants were placed in offices, the relative humidity increased significantly and actually stabilized at the recommended range of 30 to 60 percent. In the absence of plants, the relative humidity in offices was slightly below the recommended range for human comfort levels.

Humidity levels play an important role in employee health. When humidity levels are too low you are more likely to develop a cold or catch the flu, and when levels are too high you are more vulnerable to disease and illness.

Plants contribute to interior humidity by adding moisture to the air through transpiration and secondarily through evaporation from growing media and drainage dish surfaces. The relative humidity in the offices stabilized because plants naturally reduce their levels of transpiration when relative humidity was high and increased the rate of transpiration when lower relative humidities were present. The study documented that plants did not contribute excessive amounts of moisture to any of the interior spaces studied.

Researchers recorded the relative humidity of office space in a building with a central, forced air system in the presence and absence of plants. Measurements were taken during four consecutive winter months. Once each week, plants were added or removed as required. Humidity and temperature were recorded every six hours. A variety of plant species were used. Air exchange rates were estimated to average one to two air changes per hour.

Relative humidity inside buildings should be maintained to prevent damage or harm caused by high or low levels of moisture. Buildings are routinely designed to remove humidity by venting interior air to the outside. Without the exchange of air, interior relative humidity would rise to saturation because there are many sources of moisture in most buildings: people release moisture through their skin and as they breathe, and moisture may be emitted from cooking and washing.

Most buildings do not have systems to maintain humidity within desirable ranges. Those with systems often have problems with humidifiers that become contaminated by microorganisms, which can cause human disease. When the relative humidity of interior air is too low, workers develop colds and virus infections more frequently. Materials are damaged. For example, wood will dry out, and through variations in humidity, will crack and creak.

Similarly, high relative humidity in buildings causes numerous problems. The condensation of windows and exterior walls in winter can result in structural damage. These repairs as well as others are costly. Molds and mildews grow when relative humidity exceeds 75 percent, and dust mites multiply faster in environments with higher relative humidities. Again, workers exposed to unhealthy conditions become more vulnerable to disease and illness.

If such a large body of credible research didn't exist, it would be hard to believe that a solution as simple and economical as indoor plants can address a problem as menacing and expensive as poor indoor air quality.

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