

Indoor plants and well-being

Green views

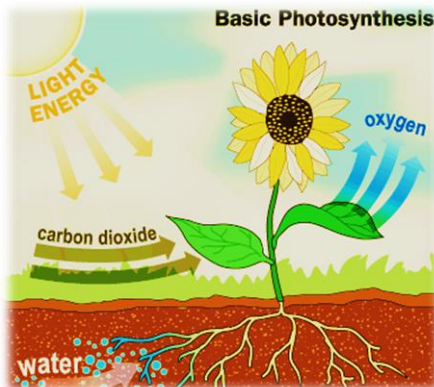
Views from buildings of green landscapes and even images of green views have a positive effect on well-being. Over the last 30 years research studies and theories as to why this may be, have been accumulating:

- Biophilia hypothesis - humans have a natural affiliation with other living organisms and are instinctively drawn to natural environments (Wilson, 1984).
 - Contact with nature has a positive effect on our well-being, and conversely, deprivation of natural surroundings can be linked to bad health and negative behaviour (Kaplan & Kaplan 1989)
 - A cross-cultural preference for savanna-like landscapes has been established. Stress reduction studies that suggest scenes of the countryside elicit relaxation responses while urban scenes do not (Frumkin 2001).
 - Images of green scenes and green views from hospital beds reduce the need for pain killers after surgery (Ulrich, 1984, 1993, 1999)
 - Similar green views or images in prisons reduce inmates need for medical consultations (Moore, 1981).
- (Photo courtesy of The Magic of a Tree House, Mike Hanlon)



So with all this in mind, what further effects on wellbeing arise when you bring plants indoors?

A breath of fresh air



In the late 1980's, NASA (Stennis et al, 1989) studied houseplants as a way to purify the air in space facilities. They found that several plants filtered out common volatile organic compounds (VOCs) found in the urban and built environment. Including:

- Formaldehyde - found in cleaning products, toilet paper, tissues, car exhaust fumes, plywood, particleboard, foam insulation
- Benzene- found in chemical based cleaners, paints, varnish, colour printing, plastics, detergents
- Xylene - solvent used in leather, rubber, printing industries
- Or trichloroethylene – in dry cleaning fluid

As a means of improving air quality *House plants for your health* recommend two or three plants in 8"-10" pots for every 100 sq. ft. in order to clean the breathing air zone (about 6 to 8 cubic feet around a person). Air quality should improve in around one week. See Table1, **Plants' air filtering properties** overleaf.

- Peace lily (*Spathiphyllum*) topped NASA's list for removing all three of most common VOCs - formaldehyde, benzene and trichloroethylene. It can also combat toluene and xylene.
- Ferns had the highest formaldehyde-removal efficiency of all the plants tested (Claudio, 2011)
- English ivy (*Hedera helix*) reduces airborne faecal-matter particles.

Table1 **Plants' air filtering properties** adapted from *House plants for your health*:

Chemical	Source in your home	Cleansing Plant
Formaldehyde	foam insulation plywood particle board clothes carpeting furniture paper goods household cleaners water repellents	Azalea (Rhododendron simsii) Dieffenbachia Heart leaf philodendron (Philodendron oxycardium) Spider plant (Chlorophytum comosum) Golden pothos (Scindapsus aureus) Devils Ivy Bamboo palm (Chamaedorea sefritzii) Corn plant Chrysanthemum (Chrysanthemum morifolium) Mother-in-law's tongue Poinsettia
Benzene	tobacco smoke gasoline synthetic fibres plastics inks oils detergents	English ivy (Hedera helix) Chrysanthemum (Chrysanthemum morifolium) Gerbera daisy (Gerbera jamesonii) Red-edged dracaena (Dracaena marginata), Warneck dracaena (Dracaena deremensis 'Warneckii') Peace lily (Spathiphyllum)
Trichloroethylene	dry cleaning inks paints varnishes lacquers adhesives	Chrysanthemum (Chrysanthemum morifolium) Gerbera daisy (Gerbera jamesonii) Peace lily (Spathiphyllum) Red-edged dracaena (Dracaena marginata) Warneck dracaena (Dracaena deremensis 'Warneckii')
Other plants- very effective not listed above:		lady palm - dwarf date palm - Weeping fig (Ficus benjamina) - Kimberley queen - Areca palm - Boston fern - Peace lily (Spathiphyllum) - Florist's mum - Rubber plant

Dust with plants!

The good news is that placing plants around a room reduces dust levels (Lohr 1992, Lohr & Pearson-Mims 1996). In an experiment conducted at Washington State University computer lab, with plants, dust was lower than in their absence. Because computer hard drives can be destroyed by excessive dust, increased particulate matter (dust) was a special concern. The results demonstrated that the plants were not contributing to dust. Instead, dust levels were significantly lower than when plants were absent. The plants occupied only 5% of the room - located around the periphery of the office.

Indoor plants, the office & well-being



Research findings also show that plants in offices can improve a sense of well-being and health. Health problems affected by the indoor atmosphere occur less frequently, and employees feel the plants to be a positive element (Fjeld, 1994). Whilst plants can be used to moderate humidity to healthy levels for humans (Lohr 1992, Lohr & Pearson-Mims 1996). Studies document some of the benefits of adding plants to a windowless work place e.g. a college computer lab. Participants' blood pressure and emotions were monitored while completing a simple, timed computer task in the presence or absence of plants. When plants were added to the space this, the participants were more productive (12% quicker reaction time on the computer task) and less stressed (systolic blood pressure readings lowered by one to four units). Immediately after completing the task, participants in the room with plants present reported feeling more

attentive (an increase of 0.5 on a self-reported scale from one to five) than people in a room with no plants.' (Lohr et al)

References

- Claudio, L., 'Planting Healthier Indoor Air' in *Environmental Health Perspectives*, Oct 2011; 119(10): a426–a427, Published online Oct 1, 2011. doi: 10.1289/ehp.119-a426 at <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3230460/>
- Frumkin H. 2001, 'Beyond Toxicity Human Health and the Natural Environment' *American Journal of Preventative Medicine*, 2001; 20(3):234–240
- Kaplan, R., Kaplan S., 1989, *The experience of nature: A psychological perspective* Cambridge University Press.
- Lohr, V.I. 1992. **The contribution of interior plants to relative humidity in an office**, p. 117-119. In: Diane Relf (ed.). *The Role of Horticulture in Human Well-being and Social Development*. Timber Press, Portland, OR.
- Lohr, V.I. and C.H. Pearson-Mims. 1996. **Particulate matter accumulation on horizontal surfaces in interiors: Influence of foliage plants**. *Atmospheric Environment* 30(14):2565-2568.
- Lohr, V.I., Caroline H. Pearson-Mims, and Georgia K. Goodwin 2
Interior Plants May Improve Worker Productivity and Reduce Stress in a Windowless Environment¹Department of Horticulture and Landscape Architecture, Washington State University, Pullman, WA 99164-6414 (This Journal of Environmental Horticulture article is reproduced with the consent of the Horticultural Research Institute (HRI – www.hrresearch.org), which was established in 1962 as the research and development affiliate of the American Nursery & Landscape Association (ANLA – <http://www.anla.org>).
- Moore, E. O., 1981, *Environmental Systems* 11, 17–34
- Stennis, John C., Wolverton, B.C., Johnson, Anne, Bounds, Keith, *Interior Landscape Plants for Indoor Air Pollution Abatement Final Report*, NASA, Sept. 1989.
- Ulrich R.S., 1984, 'View through a window may influence recovery from surgery' *Science*, 224(4647), 420-421.
- Ulrich R.S., Lunden O. and Eltinge J. L., 1993 'Effects of Exposure to Nature and Abstract Pictures on Patients Recovering from Heart Surgery' Abstract published in *Psychophysiology*, Vol. 30 Supplement 1993, p 7.
- Ulrich, R. S. (1999). 'Effects of gardens on health outcomes: Theory and research'. In C. Cooper-Marcus & M. Barnes (Eds.), *Healing Gardens: Therapeutic Benefits and Design Recommendations*. New York: John Wiley, pp. 27-86.
- Wilson, Edward O., 1984, *Biophilia*, Harvard University Press
- Wolverton, Bill, Ph.D. "[Plants: Why You Can't Live Without Them](http://www.wolvertonenvironmental.com/book1.htm)", Wolverton Environmental Studies at <http://www.wolvertonenvironmental.com/book1.htm>
- House plants for your health*, <http://dev-kinginstitute.cloudaccess.net/resources/articles/182-house-plants-for-your-health.html>, accessed 4/11/14 11:20 BST
- Indoor Plants Effective in Reducing Airborne Particulates, Removing Pollution and Improving Air Quality*, <http://www.standupgardens.com/doc/article03.pdf> , accessed 4/11/14, 11:52 BST
- Fjeld, Tøve, 1994, *Do Plants in Offices promote Health?* Agricultural University of Norway, Ås/Oslo <http://www.plants-for-people.org/eng/science/plantsinoffice.html>

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