

Living Plants Keep Us Healthy

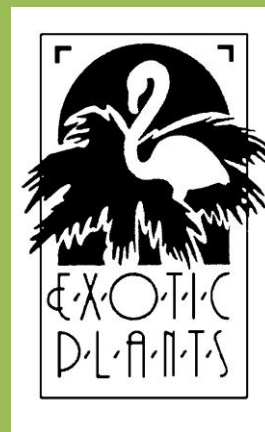


Exotic Plants Ltd. “You Haven’t Gone Green Until The Plants Arrive” – Kifumi Keppler

In the late 1960s, Bill Wolverton, Ph.D., an environmental scientist, was working with the U.S. military to clear up the environmental messes left by biological warfare centers. In a test center in Florida, where a de-foliation herbicide called Agent Orange had entered the local waters through a nearby government test site at Elgin Air Force Base, he and his people discovered that swamp plants were actually eliminating Agent Orange. Agent Orange was a powerful defoliant which was used by the U.S.A. in Vietnam during the Vietnam War.

This success behind him, he wanted to pursue this line of research and moved to the Mississippi Test Center, now known as NASA’s Stennis Space Center. NASA funded him to look into Nature’s ability to cleanse itself, and into a closed system environment’s eco support with a view to helping design sustainable living quarters for space. He was given the task of cleaning the center’s waste water using plants. To this day, instead of a septic tank, the center still uses his system that employs water hyacinth plants.

By 1973, NASA had identified 107 volatile organic compounds, VOCs, in the Skylab space station. All synthetic materials that form our modern furnishings, and were also used in Skylab, exude low-level gases, known as off-gassing. When those chemicals, like benzene, formaldehyde, trichloroethylene, all potential carcinogens and irritants, are trapped in a closed environment such as Skylab, the inhabitants become ill.



Established 1972, Exotic Plants has grown to become one of the premier providers of interior plant care, specializing in all natural organic plant care. We will care for your plants on a weekly basis. Your beautiful plant will be watered, trimmed, cleaned, dusted and fertilized each week by our talented and caring staff. Plants are fed every month with an all natural fertilizer called Shur-Crop™. Shur-Crop is our exclusive and entirely natural plant food made from 100% sea kelp & live enzymes. It provides a perfect balance of all natural nutrients for most interior plants. When plants are attacked by common pests or gnats, we use soap-based products by Safer™. This is an OMRI listed product and is compliant for use in organic gardening. OMRI is the Organic Material Review Institute of America. This formula removes a wide variety of insects with the least amount of harm to your interior environment. These simple steps ensure that you, your plants and environment are well cared for NATURALLY!

916 . 922 . 4769
www.exoticplantsltd.com

**Exotic Plants is a Certified City of
Sacramento Small Business.
(Certification # 1267)**

Around this time, America had an energy crisis and offices and homes were being built to be more energy efficient, and thus more airtight. This, of course, reduced air circulation and that, combined with the use of modern building materials, caused the same effects as the Skylab astronauts were suffering from. Now called Sick Building Syndrome, it is caused when the toxins in the modern materials became trapped in the buildings because of the lack of air circulation.

Unsurprisingly, there are many volatile compounds used in the manufacture of our modern furniture, furnishings, and the technology we use daily. The volatiles are in adhesives, in carpeting, and even in the white correction fluid we use in offices. We cannot avoid these chemicals that form part of our daily lives.

The most common ones are listed below:

- Benzene, used in solvents, detergents, oils, paints, synthetic fibers, plastics, and inks.
- Trichloroethylene, used in printing inks, varnishes, lacquers, dry cleaning, and adhesives.
- Carbon monoxide, found in fuel-fired furnaces, gas water heaters, fireplaces and wood stoves, gas stoves, and gas dryers.
- Formaldehyde, used in plywood, particle board, carpeting, furniture, clothes, paper goods, and household cleaners.

What Wolverton discovered in his tests was that the plants produced water vapor that created a pumping action to pull contaminated air down to their roots. There the contaminants were converted into food as the plant's root systems, and the soil bacteria, converted the VOS into a food source for the plants. The more air that circulated around the roots of the plant, the cleaner the air became.

Wolverton found that certain plants had an affinity with specific toxins and could remove them from the air more easily than others. Most of the plants effective in removing indoor air pollutants are not exotic and are readily available. They include English ivy, aloe vera, ficus benjamina, areca palm, bamboo palm, sanseveria, philodendrons, all of the dracaenas but especially the Janet Craig, chrysanthemums, bromeliads and orchids. Orchids and bromeliads were found to be the only plants in his list that photosynthesize at night.

To get the best results, Wolverton used activated charcoal in the plant pot, then a fan to ensure good air circulation round the plants. The VOS are drawn into the charcoal to be utilized by the roots of the plant, and the soil bacteria, into a food source.

By 1990, Bill Wolverton had left NASA and had set up his own firm called Wolverton Environmental Services which is a small environmental consulting firm that is continuing his work in the cutting-edge field of phytoremediation. The Company advocates the use of plants and their root associated microorganisms to biodegrade and treat indoor air and water pollution and has developed many systems for businesses and potentially for space exploration and permanent bases on the Moon or Mars.

You don't need to turn your home into a jungle to help clean the air in your home. Wolverton figures two to three 8-10" plants (container size) for every 100 square feet of floor space can do the job.

Of course, it goes without saying that you must look after the plants properly. A lot of plants could mean excessive humidity, which can contribute to the growth of mold and bacteria and can encourage unwanted pests. To prevent that, don't let your plants sit in stagnant water. Apart from anything else, it's a good way to kill your plant, plus the sour water will smell. Self watering planters, which have built-in watering tubes, avoid the problem altogether by routing water directly to a reservoir in the soil.

Wolverton cautions that plants should never be thought of as a cure-all. "If you have a new building with serious indoor air pollution, even a large number of plants isn't going to solve the problem," he says. But a plant in your "personal breathing zone"— which Wolverton defines as the six to eight cubic feet of air surrounding an individual— can be a comforting presence.

"If you spend a lot of time at a computer or in an easy chair watching TV, try to have a nice plant sitting near you," he suggests. "Because the closer you are to that plant, the more it's going to benefit you."

White Paper by Lisanne Norman 2008

Bibliography

<http://www.zone10.com/tech/NASA/Fyh.htm>

http://www.sti.nasa.gov/tto/Spinoff2007/ps_3.html

<http://www.wolvertonenvironmental.com/>

<http://www.nationalwildlife.org/nationalwildlife/article.cfm?issueID=16&articleID=220>

Wolverton: How to Grow Fresh Air

Wolverton: Eco Friendly House Plants

Clean Air Plants

The following 20 plants were given the highest ratings for removal of chemical vapors in Dr. Wolverton's Book "Eco Friendly House Plants". The book gives information on 50 plants tested.

Plant Name	Ability(out of 10) to remove chemicals	Lighting Conditions	Notes
Areca Palm (<i>Chrysalidocarpus lutescens</i>)	8 Formaldehyde, Benzene, Carbon Monoxide	Semi-sun 2 hrs of sun in winter	Easy to grow. Requires high humidity
Lady Palm (<i>Rhapis excelsa</i>)	7 Formaldehyde, Benzene, Carbon Monoxide	Semi-sun 2 hrs of sun in winter	Easy to grow
Bamboo Palm (<i>Chamaedorea seifrizii</i>)	9 Benzene & Formaldehyde	Semi-sun 2 hrs of sun in winter	Easy to grow
Rubber Plant (<i>Ficus robusta</i>)	9	Semi-shade only indirect light	Easy to grow
Dracaena 'Janet Craig' (<i>Dracaena deremensis</i> 'Janet Craig')	8 Benzene, Trichloroethylene	Semi-sun = 2 hrs of sun in winter	Easy to grow
English Ivy (<i>Hedera Helix</i>)	9 Benzene, Formaldehyde, Trichloroethylene	Semi-sun 2 hrs of sun in winter Semi-shade only indirect light	Requires high humidity. Parts poisonous. Prone to spider mite.
Dwarf Date Palm (<i>Phoenix roebelenii</i>)	9 Formaldehyde, Benzene, Carbon Monoxide	Semi-shade only indirect light	
Ficus Alii (<i>Ficus macleilandii</i> 'Alii')	7 Formaldehyde, Benzene, Carbon Monoxide	Full sun min. 5 hrs of sun	Easier to grow than F. Benjamina
Boston Fern (<i>Nephrolepis exaltata</i> 'Bostoniensis')	9 Benzene, Trichloroethylene, Formaldehyde	Semi-sun 2 hrs of sun in winter Semi-shade only indirect light	Requires humidity and good light
Peace Lily (<i>Spathiphyllum</i> sp.)	8 Benzene, Trichloroethylene, Formaldehyde	Semi-sun 2 hrs of sun in winter Semi-shade only indirect light	Easy to grow
Corn Plant (<i>Dracaena fragrans</i> 'Massangeana')	8 Formaldehyde	Semi-shade only indirect light	Very easy to grow
Kimberley Queen (<i>Nephrolepis obliterata</i>)	9 Alcohols & Formaldehyde	Semi-sun 2 hrs of sun in winter Semi-shade only indirect light	Tolerant fern
Florist's Mum (<i>Chrysanthemum morifolium</i>)	9 Trichloroethylene, Benzene & Formaldehyde	Full sun min. 5 hrs of sun	Easy to grow
Gerbera Daisy (<i>Gerbera jamesonii</i>)	9 Benzene, Trichloroethylene, Formaldehyde	Full sun min. 5 hrs of sun Semi-sun 2 hrs of sun in winter	
Dumb Cane (<i>Dieffenbachia</i> 'Exotica Compacta')	7 Formaldehyde	Full sun min. 5 hrs of sun Semi-sun 2 hrs of sun in winter	Very easy to grow Toxic
Weeping Fig (<i>Ficus benjamina</i>)	8 Formaldehyde	Full sun min. 5 hrs of sun	Requires draught-free environment
Schefflera (<i>Brassaia actinophylla</i>)	8 Benzene, Formaldehyde, Toluene	Semi-shade only indirect light	
Dendrobium Orchid (<i>Dendrobium</i> sp.)	7 Acetone, Ammonia, Chloroform, Ethyl Acetate, Methyl Alcohol, Xylene Formaldehyde	Semi-sun 2 hrs of sun in winter	
Tulip (<i>Tulipa gesneriana</i>)	7 Formaldehyde, Xylene, Ammonia	Full sun min. 5 hrs of sun	Bulb poisonous when eaten
Spider Plant (<i>Chlorophytum comosum</i> 'Vittatum')	6 Carbon Monoxide & Formaldehyde	Semi-sun 2 hrs of sun in winter Semi-shade only indirect light	Easy to grow

Number of plants

The recommendation generated by NASA studies is to use 15 to 18 good sized houseplants in 6 inch (15 cm) to 8 inch (20 cm) containers to improve the air quality in an average 1,800 square-foot house. The more vigorously they grow, the better job they'll do.

A personal breathing zone is an area of 0.17 to 0.23 cubic metres (6-8 cubic feet) surrounding a person. These are usually areas where an individual remains for several hours working, watching TV or asleep. Plants placed within this zone can add humidity, remove bioeffluents and chemical toxins and suppress airborne microbes. Plant-filled rooms contained 50 to 60% fewer airborne molds and bacteria than plant-less rooms.

Where Volatile Organic Chemicals Are Found

CHEMICAL	SOURCE
Acetone	Paint, Coatings, Finishers, Paint Remover, Thinner, Caulking, Nail Polish, Nail Polish Remover
Benzene	Gasoline, Inks, Oils, Paints, Plastics, Rubber, Dyes, Tobacco Smoke, Synthetic Fibers, Detergents, Pharmaceuticals Used in Nylon, Styrene, Rubber, Lubricants, Dyes, Detergents, Explosives, Napalm & Pesticides
Formaldehyde	Tobacco Smoke, Plywood, Foam Insulation, Room Deodorizers, Waxed Paper, Paper Towels, Permanent Press, Fabrics, Fiberboard, Upholstered Furniture, Carpets, Pressed Wood Products
Trichloroethylene	Inks, Paints, Lacquers, Varnishes, Adhesives, Dry Cleaning, Spot Removers, Fabric/Leather cleaners
Toluene	Solvent for : Adhesives, Paint, Paint Thinners Leather Tanners, Disinfectants, Rubber, Printing Ink, Metal Cleaners, Fuel Antifreezes, Flame Retardants, Aviation Gasolines
Carbon Monoxide	Gas Water Heaters, Fuel Fired Furnaces, Fireplaces & Wood Stoves, Gas Stoves, Dryer