



## Indoor ornamental plants in improvement of environment

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The environment affects our health in a variety of ways. The interaction between human health and the environment has been extensively studied and environmental risks have been proven to significantly impact human health, either directly by exposing people to harmful agents, or indirectly, by disrupting life-sustaining ecosystems. Environmental degradation is the deterioration of the environment through depletion of natural resources such as air, water and soil; the destruction of ecosystems and the extinction of wildlife. Environmental degradation may be defined as any change or disturbance to the environment perceived to be deleterious or undesirable.

When plants transpire water vapor from their leaves, they pull air down around their roots. This supplies their root microbes with oxygen. The root microbes also convert other substances in the air, such as toxic chemicals, into a source of food and energy. Microbes, such as bacteria, can rapidly adapt to a chemical contaminant by producing new colonies that are resistant to the chemical. As a result, they become more effective at converting toxic chemicals into food the longer they are exposed to the chemicals. It is also important to remember that the efficiency of plants as a filtering device increases as the concentration of chemicals in the air increases. For example, the removal rate of a chemical is much higher at 7 parts per million (ppm) exposure than at 2 ppm. The several common species of interior landscape plants have the ability to remove compounds such as benzene and hexane in the range of 50% to 75% of the total volatile organic compounds. Internationally respected in the field of air quality research, Dr. Margaret Burchett goes so far as to declare the following. "...to ensure sustainability of the urban environment, satisfying the 'triple bottom line' of environmental, social and economic considerations, it is expected that indoor plants will become standard technology—a vital building installation element, for improving indoor air quality." The common toxins found in indoor air:

- Formaldehyde, which can be emitted by particle board or pressed wood products, used in manufacturing of office furniture, grocery bags, waxed papers, facial tissues and paper towels, adhesive binders in floor

coverings, carpet backings and permanent-press clothes, heating and cooking fuels like natural gas, kerosene, and cigarette smoke.

- Benzene and toluene, which can be emitted by gasoline, inks, oils, paints, plastics and rubber, detergents, pharmaceuticals and dyes.

- Trichloroethylene, which can be emitted by printing inks, paints, lacquers, varnishes, and adhesives.

- 1,1,1-trichloroethane

- Octane: Paints, adhesives, building materials

- Aliphatic hydrocarbons: Synthetic paints and odourant

- Chloroform

- Xylene

- Dichloromethane

- Tetrachloroethylene: Tap water, cleaning agents, insecticides plastic products

- Acetone

- CO and CO<sub>2</sub>

Researchers from NASA and other organizations recommend at least 15-18 good-sized plants for a house or apartment of 1800 square feet or 167 square meters. NASA deals with volatile organic compounds (VOCs) on the Space Station by using a dozen varieties of plants to clean the air. Their top ten plants are:

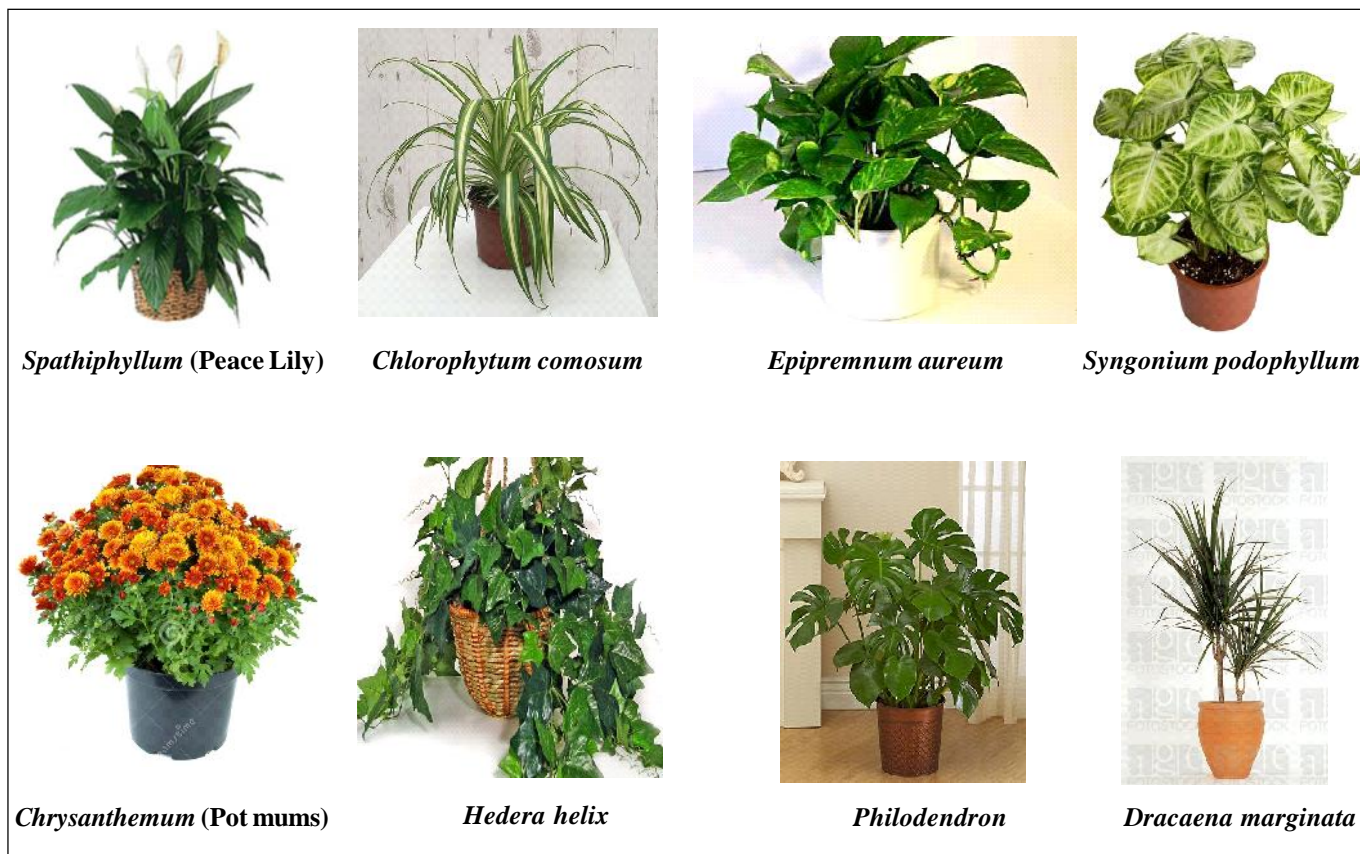
**Spathiphyllum (Peace Lily):** Cleanser of pollutants like benzene, formaldehyde and trichloroethylene. Cleans best at one plant/10 sq m.

**Chlorophytum comosum (Spider Plant):** Grows from a central rosette and produces new shoots, branched stolons with small white flowers, as well as baby plantlets. Effective in removing formaldehyde, trichloroethylene.

**Epipremnum aureum (Devil's Ivy):** Excellent air cleansing plant but toxic for pets or kids. Decorative marbled leaves with easy maintenance. *E. aureum*, grown on an activated carbon filter system reduced air levels of benzene and trichloroethylene inside a Plexiglas chamber measuring 0.58 cubic yard from approximately 36 ppm to detectable levels within 2 hours.

**Syngonium podophyllum (Arrowhead Plant) :**

*Hedera helix* (English Ivy): Filters formaldehyde, aerosols and fecal particles. There are different species



*Spathiphyllum* (Peace Lily)

*Chlorophytum comosum*

*Epipremnum aureum*

*Syngonium podophyllum*

*Chrysanthemum* (Pot mums)

*Hedera helix*

*Philodendron*

*Dracaena marginata*

of the English Ivy, differing by color, shape, and size. The plant is poisonous.

**Philodendron (Heartleaf or Elephant Ear Philodendron)** : Heartleaf philodendron (*Philodendron scandens* ‘oxycardium’) and Elephant Ear Philodendron (*Philodendron domesticum*) remove formaldehyde at high concentrations and are poisonous.

**Gerbera jamesonii (Gerbera Daisy)** : Decorative cut flower and remove benzene and trichloroethylene from air.

**Ficus benjamina (Weeping Fig)**: Small fruit attracts many birds and filter indoor air toxins.

**Dracaena marginata (Red-edged dracaena)**: Removes benzene, formaldehyde, xylene and toluene.

**Chrysanthemum (Pot Mum)** : Ferns had the highest formaldehyde removal efficiency of the five classes of plants tested, with *Osmunda japonica* determined to be most effective of all 86 species, coming in at 50 times more effective than the least (*D. deremensis*) efficient species.

The continuous environmental degradation could be attributed to population pressure, but lingering mainly on mismanagement of resources. The present environmental

situation requires redefining strategies to bring about environmental management that are in conformity with national and international development efforts.

Ornamental plants have a wide spectrum of uses in management; the most obvious are the direct effect on the ecological position of human being. The objective of ornamental horticulture is the functional and aesthetic integration of people, building and site, using plants and space as its main tools. The necessity of it in landscape architecture is for positive control of the fast changing landscape for the future.

Ornamental plants can also be used as cover mat on eroded areas, they help in eliminating dust, and they reduce glare, air pollution, heat buildup and noise pollution. They provide convenient stadia for sport activities such as football, soccer, lawn tennis and other athletics. They provide good location for adventure parks, children playing ground rest areas and other social events. Ornamental plants also serve as complementor, attractors, emphasize, diverters, indicators and provide aesthetic function by creating attractiveness for human activities.

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