

# AIR PURIFYING INDOOR PLANTS –OXYGEN BOMBS FOR HOMES

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Home is a place where we feel safe to live and it protects us from vagaries of weather like sunlight, bad colds, strong winds, rain, pollutions, etc. But indoor contains certain concentrations of toxins even more than outdoor air (2-3 times more) if there is no proper ventilation. We all know that some indoor plants help in eliminating harmful toxins and improving household air conditions. But these plants only help in reducing the concentrations of these chemicals but not in eradicating their emissions into the air. So, knowing the sources from where these chemicals are getting emitted into indoor air is also important to find any solution for it. By this we can reduce the use of those entities and grow plants accordingly. Following are the sources from which the chemicals emit.

## Sources of Indoor Air Pollution

**1. Burning of traditional fuels:** According to WHO (World Health Organization), annually around 4.3 million people are dying due to household air pollution. The main source of this pollution is the burning of traditional fuels such as firewood, charcoal, cow dung (emits dioxins) for cooking purposes.

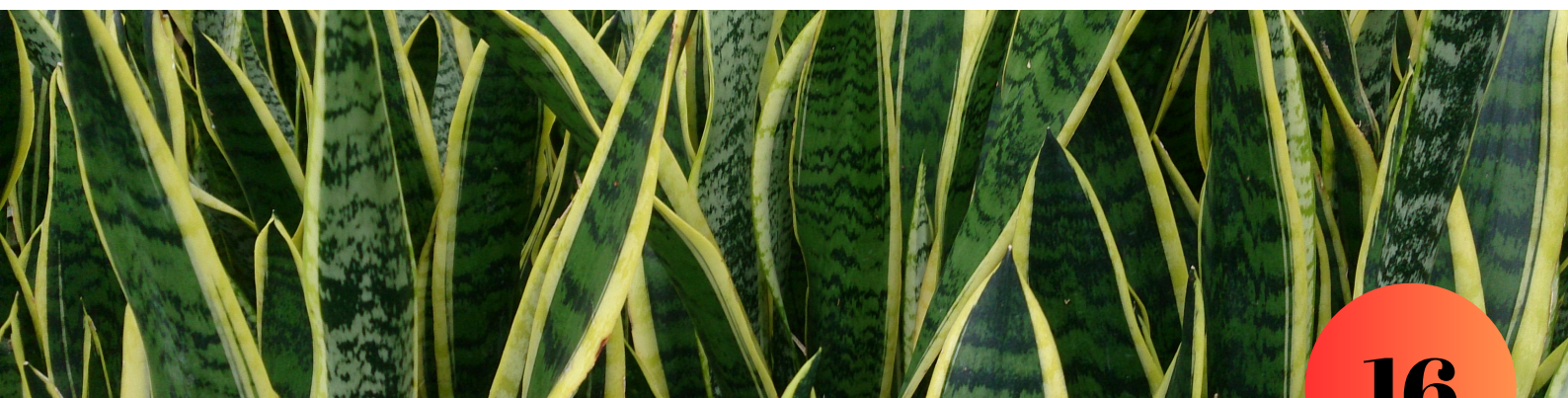
**Chemicals/pollutants they emit:** Particulate matter, CO, NO<sub>2</sub>, SO<sub>2</sub>, and polycyclic aromatic hydrocarbons.

Using these fuels (mainly in villages) may be our tradition, but they result in emissions of many harmful pollutants. In villages women and children are mostly affected by these chemicals as they spend most of their time indoors. This is why they are more prone to lung cancers, strokes, heart problems, and also to some pulmonary diseases.

**2. Burning of organic materials:** Burning of organic materials like wood, coal, and petroleum products like kerosene also results in the emission of chemicals into our household air. Even in urban areas these organic materials are used to heat water and for other purposes.

**Chemicals they emit:** Benzene, xylene, toluene.

**3. Tobacco smoke:** Tobacco is injurious to our health. It not only ruins our health but also ruins the environment. Tobacco smoke contains more than 7000 chemicals that are detrimental to both humans and the environment.



Out of these 7000, 70 chemicals are known to cause cancers in humans are called carcinogens.

**Chemicals they emit:** Benzene, toluene, and formaldehyde.

**4. Dry cleaned clothes:** Dry cleaning may improve the longevity of your clothes, but many chemical-based solvents are used in this process of cleaning. Those chemical residues present in the clothes escapes into the air and pollute it.

**Chemicals they emit:** Trichloroethylene and perchloroethylene.

**5. Paints, resins, glues, lacquers, building products, paper products:** All these products contain formaldehyde in their composition which is a serious air pollutant. Due to its toxicity, it is banned in the USA and some other countries. It is even classified as a human carcinogen by WHO. We all are exposed to small amounts of formaldehyde that is emitted by these products around us.

**Chemicals they emit:** Formaldehyde along with some other traces of elements. Formaldehyde can cause problems like eye, skin, and throat irritations. At higher exposure, it can cause cancers too.

**6. Household products:** Products like dishwashing liquids, detergents, pesticides, carpets, insect repellents, air fresheners, deodorants, electric appliances, wooden furniture are composed of many chemicals, and some of these chemicals get emitted into the air and pollute it.

**Chemicals they emit:** Volatile organic compounds (VOC).

As these chemicals escape into the air in the form of vapor, they are known as volatile organic compounds. Most of the above-mentioned chemicals like benzene, toluene, and formaldehyde comes under this group of chemicals. At higher concentrations, these chemicals can result in eye irritations, respiratory problems, and headaches.

**7. Other sources:** Many products like cement pipes, gaskets, clothing, cement flat sheets, vinyl floor tiles, roofing coatings, etc. that are present in our home are made of using asbestos as an ingredient in their compositions.

**Chemicals they emit:** Volatile organic compounds, VOC, asbestos. Asbestos is banned in 55 countries as it is a carcinogen and known to cause lung cancers, asbestosis, mesothelioma, and many other health problems in humans when inhaled. So, these are some of the sources of air pollution and this is how our indoor air gets polluted. There is a need to protect ourselves from these harmful chemicals in our home. Using chemical formulated sprays or products to reduce their concentrations is not a permanent solution as they can't be used all the time and may lead to some or other problems. The simplest solution to this problem is growing air-purifying indoor plants. Like how trees purify the outdoor air, some indoor plants can purify the indoor air. These plants help in removing harmful particles (chemicals, pollutants) that are present in the air.

In order to improve the air quality in a sealed spacecraft, NASA has conducted a study on plants in 1980 and they concluded that the roots and soil of house plants reduced airborne Volatile organic compounds (VOC). Hence, they have recommended a few plants that performed well in purifying air. These plants can be placed in different corners of home to keep indoor air healthy. Areca palm, Aloe vera, Spider plant, Rubber plant, Broad lady palm, Chrysanthemum, Gerbera daisy, Weeping fig, Money plant, Dracaena, Aglaonema are some of the air-purifying plants that are recommended by NASA.

Besides these plants Peace lily, ZZ plant, Boston fern, Fiddle leaf fig, English ivy are also known to improve the air quality around us. some of the air purifying plants and the pollutants they clear/remove:

**Areca palm:** Xylene, toluene, formaldehyde

**Spider plant:** Carbon monoxide (CO), xylene

**Snake plant:** Benzene, xylene, toluene, formaldehyde, trichloroethylene

**Chinese evergreen (aglaonema):** Benzene, formaldehyde

**Rubber plant:** Carbon dioxide (CO<sub>2</sub>)

**Money plant:** Benzene, xylene, toluene, formaldehyde

**Aloe vera:** Benzene, formaldehyde

**Broad lady palm:** Ammonia (in cleaning products)

**Dracaena/dracaena:** Xylene, trichloroethylene

**Weeping fig:** Xylene, toluene, formaldehyde

**Gerbera daisy:** Benzene, trichloroethylene

**Peace lily:** Benzene, xylene, toluene, formaldehyde, trichloroethylene

**Boston fern:** Xylene, formaldehyde

**English ivy:** Benzene, formaldehyde

**ZZ plant:** Xylene, toluene, benzene

**Chrysanthemum:** Benzene, xylene, formaldehyde, and ammonia.

**1. Areca palm:** Areca palm is the most popular indoor plant and is available in different sizes in nurseries. It is tolerant to partial shade to full sun. They can be grown even outdoors but are mostly maintained indoors to have bright interiors. It is a very good air purifier.

**Toxins or chemicals it removes:** Xylene, toluene, formaldehyde.

**Common problems:** Overwatering and keeping the soil wet all the time leads to problems like the browning of tips and yellowing of leaves and stems. So let the soil dry between every watering. Sometimes yellowing may also occur due to inadequate sunlight. In that case, place the plant in areas where it receives bright filtered sunlight.



**Care tips:** Use well-drained soil or potting mix. Protect the plant from strong afternoon rays in hot summers when maintained outdoors. Place the plant near any window if maintained indoors. Water only when the top inch of the soil becomes dry as the areca palm is sensitive to waterlogged conditions.

**2. Snake plant:** Snake plant is a wonderful indoor plant with many unique features. It stays unique in both shape and patterns of leaves. Besides purifying air, it also releases oxygen during nights. You can also place this plant in your bedrooms to improve the air conditions. It can tolerate a wide range of sunlight that is low light to full sun conditions. One can maintain it both indoors and outdoors.

**Toxins or chemicals it removes:** Benzene, xylene, toluene, formaldehyde, trichloroethylene.

**Common problem:** Like any other plant, yellowing, and dropping of older leaves are common. If there is yellowing in other leaves then it may be due to placing the plant in the complete shade even without fluorescent light or overwatering or nutrient deficiency. If the yellowing is not due to shade/overwatering, fertilize the snake plant once a month in the growing season to improve the condition.

**Caring tips:** As snake plant is a succulent, water requirement will be low. It performs well even if watered thoroughly once a week. Bright indirect light is ideal for its growth and development. Do not overwater the plant as it may lead to soft and soggy leaves. Always use well-drained soil for succulents. It cannot stand wet/waterlogged conditions as it may lead to the rotting of roots. Do not fertilize the plant in winter as it will be dormant.

**3. Aglaonema/Chinese evergreen plant:** It is believed to be luck bringing plant in China and it is widely grown in Asian countries. The variegated species of aglaonema differ in size, color, and pattern of leaves.

**Toxins or chemicals it removes:** Benzene, formaldehyde

**Common problems:** Aglaonema also shows yellowing when it is overwatered. So always water plants only when the top inch of the soil becomes dry. Mealybugs are common pests of aglaonema. Overwatering favors mealybugs infestation as they are attracted to wet conditions. They reside in nodes of leaves and damage the leaves. Wipe them with a damp cloth and spray neem oil to avoid further infestation. If leaves are already infected badly, remove them.



Areca palm



Snake palm



Aglaonema/Chinese evergreen plant



**Care tips:** Aglaonema leaves are very sensitive to direct sunlight. Leaves tend to scorch when kept in direct light for a longer time. Place the plant anywhere in a room if it is receiving the window light. When maintained outdoors make sure you place it under a shrub/tree shade or anywhere (balconies, wall side) where it is receiving morning/ evening sunlight.

**4. Spider plant:** It is another fantastic air purifying plant that clears carbon monoxide (CO), which is very harmful when inhaled. A pigment named hemoglobin that is present in our blood helps in carrying oxygen to all parts of our body. When we inhale CO, it prevents the flow of oxygen in the blood. At higher concentrations, this may even lead to death. Having a clump of spider plants helps in regulating the CO levels in our indoor air.

**Toxins or chemicals it removes:** Carbon monoxide (CO), xylene.

As the baby plants produced on their long trailing stems look like spiders crawling down from the web, this plant is named spider plant. It has many variegated species and performs well even in low light conditions. This plant anywhere in home like hall, bedroom, and even in bathrooms.

**Common problems:** Browning of tips is the most common problem in spider plants that occur mainly due to water stress conditions. It may happen by both over and under watering. Over-fertilizing and too much sunlight may also lead to tip browning in spider plants.

**5. Peace lily:** These plants are believed to bring peace around. Peace lily is also known as Spath, it is named after its botanical name *Spathiphyllum* (genus). Spathes have spoon-like white flowers (spathes - modified leaves/bracts) which look so stunning and steal attention no matter where they are placed.

**Toxins or chemicals it removes:** Benzene, xylene, toluene, formaldehyde, trichloroethylene

**Common problems:** Although flowers appear green in the early and later stages of their life span. Some flowers remain green all the time which disfigures the decent look of the plant. This is mainly due to more than required sunlight and fertilizers. Drooping of stems and leaves: This occurs due to lack of adequate moisture in the soil. Tip burns or Sun scorching also happens due to exposure of plants to harsh sunlight.



Spider Plant



Peace Lily

**Care tips:** Peace lily can be placed anywhere in a well-lit space of home not close to a window that receives direct sunlight. While north/west-facing window is ideal Peace lily is a shade-loving plant so do not expose them to direct sunlight. This prevents green blooms and tip burns in them. It is not a heavy feeder so fertilize it with any organic fertilizers once in 75- 90 days except winters. Peace lily is very sensitive to water stress. Its leaves start drooping immediately when the moisture level in the soil becomes slightly low. So do not let the soil become completely dry before watering. It is important to keep the soil moist all the time to prevent leaves and stems from drooping.

**6. Rubber plant:** Rubber plant looks very attractive with its broad and waxy leaves. It is very efficient in removing CO<sub>2</sub> and converting it into breathable oxygen. Every plant does this, but this plant performs it more efficiently (at higher amounts). This plant grows to greater heights with shiny leaves if maintained properly.

**Toxins or chemicals it removes:** Carbon dioxide (CO<sub>2</sub>)

**Care tips:** It needs bright indirect sunlight, but not hot rays. Keep the soil moist in the growing season (summer) and slightly dry in the dormant period (winter). Wipe the leaves with a damp cloth or mist the plant to regulate the moisture level in summers. Make sure that the plant is not receiving direct sunlight as it may lead to scorching of their beautiful leaves.

**7. Aloe vera:** Aloe vera, is known for its medicinal benefits but it is also a proven air purifier that clears benzene and formaldehyde that comes from varnishes and detergents in our home.

**Toxins or chemicals it removes:** Benzene, formaldehyde

**Common problems:** Root rot and soft rot are common problems in aloe vera, that occur mainly due to overwatering. Root rot is caused by fungi while soft rot is caused by bacteria. Damp or wet conditions favor these microbial diseases in aloe vera.

**Care tips:** Use well-drained soil. It performs well in bright indirect light to full sun conditions (6-8 hours). It is very important to leave the soil dry for some days between watering to prevent the attacks of microbial diseases. As it is a succulent, it stores water in its leaves. So, watering it once in 7-10 days is ideal in the spring/summer seasons and once in 14-15 days in winters (dormant period) is ideal.



Rubber Plant



Aloe vera

**8. ZZ plant:** It is a perfect plant for both home and office. It survives well in any corner of the room as it doesn't require much sunlight. It embellishes the surroundings with its long stems and pretty shining leaves.

**Toxins or chemicals it removes:** Xylene, toluene, benzene.

**Care tips:** It performs well in low to bright indirect light conditions and can be maintained in bedrooms as it can stand the low light conditions. Water it only when the top inch of soil becomes dry. Fertilize the plant once in 30-45 days with any of the organic fertilizers.

**9. Money plant:** Money plant is one of the most commonly grown house plants of India. It believed to bring wealth and prosperity into our home. It can be either grown as a climber or a hanging plant as it looks good in both ways. Moreover, it is a good air purifying plant that helps in removing toxins from the air when grown around.

**Toxins or chemicals it removes:** Benzene, xylene, toluene, formaldehyde.

**Common problems:** Yellowing of leaves is mostly seen in money plants. This occurs mainly due to overwatering or insufficient sunlight. In many cases, it happens mainly due to overwatering. Some times this yellowing might be the early signs of root rot which occurs by prolonged wet conditions of the soil. Burning of tips mainly happens due to over-fertilizing. Scorching of leaves is seen in money plant when it is exposed to direct sunlight. So, make sure that your money plant is away from the window where it receives the direct sun rays.

**Care tips:** Money plant does well in low to bright indirect light conditions. Never place your money plant in direct sunlight as their sensitive leaves tend to scorch easily. Do not over-water your money plants as it may lead to many problems. Fertilize once in 30-40 days to boost the shoot growth of the plant.

**10. Boston fern:** Boston fern is a water-loving plant that looks exceptionally beautiful in hanging baskets with its feathery leaves.

**Toxins or chemicals it removes:** Xylene, formaldehyde

**Common problems:** Mealybugs are common pests of ferns as they love moisture conditions too. Keep a regular check on your plant and spray neem oil if there are any infestations.



ZZ Plant



Money Plant



Bosten Fern



**Care tips:** Boston fern requires a moderate-cool climate with high humidity.

Ferns require a good amount of sunlight for their development so always place your ferns in bright indirect light but not in direct sunlight. It is very important to keep the soil moist not wet, as it is a water-loving plant. Placing the pot in a tray of water with pebbles or misting the plant once or twice a week is ideal to maintain the humidity level around the plant.

So, these are some of the air purifying plants that eliminate toxic chemicals from the air to have better household air conditions. Some of these plants are toxic to humans and pets only when they are ingested. So, keep children and pets away from these plants. And the other important point to remember is overwatering of plants leads to leaching of nutrients and eventually results in yellowing and rotting kind of problems. So, never overwater the plants. In addition to growing these air-purifying plants, also check for emission of pollutants.

Preventive measures to reduce the emissions of harmful chemicals into the indoor air First and foremost, measure is Quit smoking, its smoke contains several carcinogens that pollute the air and health as well. Maintain proper ventilation throughout home. Use natural cleaning products. Strictly follow “no shoe policy” inside the home. And also ask visitors to leave their footwear outside. By this entry of unwanted pests and chemicals into the home will be reduced. Invest in a good vacuum cleaner, that is capable of filtering small particles present in mats, carpets kind of utilities. Avoid using deodorants, insect repellents, and pesticides (for plants) and get into organic ways. Reduce the use of air conditioners. Because ACs also emit chemicals like chloro-fluoro-carbons (CFCs) which are very harmful to our health and environment.

