



# IMPROVING INDOOR AIR QUALITY WITH PLANTS

Improving indoor air quality with plants and was motivated by this book "How to Grow Fresh Air". We'll start off by going over some of the causes of indoor air pollution. Then we'll discuss how certain plants reduce air contamination. And lastly, we'll go over a number of specific plants that have been found to improve indoor air quality. We'll discuss the lighting requirements and watering needs for each of the listed plants, plus some tips for general plant maintenance.

## Causes of Indoor Air Pollution:

- Are you familiar with the term Volatile Organic Compounds, or VOC's? They are naturally occurring chemicals released into the air that are toxic in large amounts. It's not such a big problem outside, unless they're in super high concentrations, it's when they get trapped inside there's trouble. They are released or "off-gassed" from a variety of sources, even the human body for example. The effects of exposure were first discovered in the 1980's. We'll go over a few of the most common, where they come from, and how they affect people when exposed to them over periods of time.
- Most people have a tv, a sofa, maybe some carpeting, or a computer in their homes, right? The bad news is they all emit volatile organic compounds. A few of the major sources of VOC emissions are plastics, resins, adhesives, plywood, and particleboard, which are the main components of most furniture, all electronics, some fabrics, some paper products, and many building materials. You know that new car smell people love so much? That is VOC's. The good news is that VOC emissions dissipate over time. The older something is, the less VOC's it produces. Someone is more vulnerable to exposure, the more new stuff they have. Dr. Wolverton, in his book "How to Grow Fresh Air" on sale today, notes that some think there is a correlation between Sudden Infant Death Syndrome and VOC exposure, since many infants are immediately exposed to new furniture and all kinds of new baby things, but there is not enough substantial evidence yet to prove this. Others believe long term exposure leads to increased chemical sensitivity and can increase asthma and cancer rates. The most common signs of overexposure are similar to allergy and cold symptoms: itching, burning eyes, sinus congestion, throat irritation, respiratory irritation, fatigue, headaches, and nervous system disorders. The most common VOC's are Formaldehyde, Xylene, Toluene, and Benzene. Formaldehyde is by far the most common. It is a known carcinogen and is found in many products because it is used so much as a preservative. Don't worry, there's more good news...

## How Certain Plants Improve Indoor Air Quality:

- All plants improve air quality in some way, but the big VOC reducing plants are primarily low-light tropicals. These guys have adapted to lower light conditions by working harder through processes called photosynthesis, transpiration, and translocation. Plus, healthy plants attract beneficial microbes that help break down matter into nutrients the plant can absorb and these microbes play a major role in air purification. But, before we get to those little guys, let's talk more about plants and the processes I just mentioned.
- The main components of a plant's daily life cycle that aid in its ability to act as an air filtration system are transpiration and translocation. Transpiration is similar to the way a mammal perspires. It's when a plant releases water vapor from tiny openings its leaves called stomata in an effort to regulate its water level. This action cools the leaves like sweat cools our skin. When the leaves become cooler than the air around them a current is created. This current helps air circulate around the plant. This movement of air helps draw VOC laden air towards the plant. The air is then either drawn to the root area or into a plant's stomata - which are like little tiny plant mouths on their leaves - where the air then goes through a process called translocation, which is when the plant "breathes in air" through its leaves and releases it around its roots. Both these processes, transpiration and translocation, bring air towards the roots of the plant where microbes take over. Microbes break down the VOC's into nutrients that the plant absorbs. And viola, cleaner air.



- All plants create a microenvironment around them by controlling humidity levels, increasing air circulation, and attracting good microbes, but of course they are better able to do this when they are healthy, so we'll talk a bit about some general plant care.

## Specific Plants found to Improve Indoor Air Quality

- The great thing about low-light tropicals, what most people refer to as “house plants”, is that most of them are really low maintenance. So, for all you folks whose thumbs are not so green, you're in luck. You cannot grow all plants indoors. Some need to “winter over”. Many plants (especially some ferns, shrubs, trees, and other flowering perennials) need to do this. If a plant is a perennial “zoned” for an area with cold winters, it probably needs to stay outside.
- Knowing about a specific plants origins can tell you a lot about what that plant needs, so it's good to find out where a plant is indigenous to when introducing it into your home. This can tell you specifically about the temperature, light, humidity, and watering needs of that plant. Whenever you bring home a new plant, the goal should be, to place it in an environment as similar as possible to the one you found it in. Still, you might see a few changes for the worse as they adapt to their new home. Here are a few telltale signs I always look for: 1) Leaves losing their color, or changing in color by losing variegation, reaching, or stretching towards a light source means they are not getting enough light; 2) yellowing leaves can mean too much water, inconsistent water, not enough nutrients, or a combination of all three; 3) leaf loss can be a sign of too little humidity, not enough light, pests, or general stress from a combination of sources; 4) mold on soil, rotting roots, or stems usually comes from overwatering; 5) insect, mold, or fungus infestation of any kind comes from an unhappy plant - healthy plants are much better at repelling pests (they have their own natural insect repellent!); 6) wilting usually means a plant needs water, but can also be from over watering, so check the soil to determine which - if a plant is wilting and the soil is dry, water it, but if the soil is wet, let it dry out.
- Repotting! Is also important indoors. Plants will start to lose leaves, die back, and dry out faster with less root space, so if you notice these signs, plus roots coming out of the bottom of the pot, it's probably time to repot. Also, watch for salt and hard mineral build up on the pot and top layer of soil. Is probably a good thing to do once a year for plants that are fast growers.
- Dusting the leaves! Is another important task for the indoor gardener. Use a soft, damp, cloth to wipe down the leaves every now and then depending on how dusty your house gets. You can also just put your plant in the sink, tub, or shower, and just wash it off. If too much dust accumulates, the stomata will get clogged and all hell will break loose.
- A quick note about lighting. Of course natural light is best. It's even better when it's diffused, or filtered in some way for plants with low light needs. Most high to medium light plants can happily sit in a windowsill with direct sun exposure, but care should be given to make sure heat from the sun is not getting trapped inside the glass and burning the leaves of the plant. High light or Full sun plants need 5 or more hours a day of direct sunlight. Medium light also called semi-sun, or semi-shade plants need 2 or less hours a day of direct sunlight. Shade plants or low light plants can live without any direct sun exposure. All plants need some amount of light. Should you notice a plant is not getting enough sun, artificial light can work too. Low light foliage plants will survive with an ordinary daylight fluorescent bulb inside an ordinary fixture (or lamp without its shade). Fluorescent bulbs give off bluer light. Flowering plants and plants that bear fruit need more red light. You can use an ordinary incandescent or tungsten bulb in an ordinary fixture if it has lower light needs for plants that like red light. Higher light fruiting and flowering plants may need a higher wattage depending on the plant. Just remember, flowering and fruiting plants need more red light or warm light, while foliage plants need more blue or cool light. Blue light also helps with growing healthy leaves, stems, and immune systems, so it's best to use a combination of both during different growth stages for flowering and fruiting plants.
- Pests: The most common pests to watch out for are spider mites, mealy bugs, scale, and aphids. Mealy bugs are the easiest to spot. They look like fuzzy white patches that like to hang out where the leaves or branches connect to the stem of a plant. Aphids are a little smaller, but still visible. They are small green insects that take over the leaves of a plant. Scale is slightly harder to detect, but they look like little brown bumps on the stems, branches, and bottom of leaves. They are brown or red oval shaped bugs that cover themselves with a waxy substance for protection when they've found a comfortable spot on your plant. Then they just hunker down and suck the life out of the plant. If you see a brown or reddish bump on the stems, branches, or bottom of your plant's leaves try to scrape it off. If it comes off in a little waxy ball, you have scale. Ick. Spider Mites are the hardest to see because they are so small. They can be red, brown, yellow, or green, but the biggest indicator of whether or not a plant has spider mites is webbing. These nasty little guys spin tiny webs all over a plant. All of these pests will kill a plant over time. If you notice leaf loss or little spots of yellow or even worse big clusters of little spots of yellow, then look for signs of these pests. A good cure all is Neem Oil. We have some in stock. It comes in spray bottles and is really easy to apply. You can also use dish soap, or insecticidal soap. Some people use Q-tips with rubbing alcohol. I am a big fan of Neem Oil because it's so easy and effective. You should quarantine the plant until the infestation is gone, and it's just good practice to never have any plants arranged in a way that they are touching each other since they need a good amount of air circulation to survive. Just remember, if you have an insect infestation, it's a sign that your plant is unhappy. Healthy plants have a natural defense mechanism that protects them from harmful insects, so once you have dealt with the insect problem, you need to figure out what made the plant unhealthy in the first place.
- Fertilizing! Plants in pots will lose nutrients much faster than plants in the ground. I personally feel that most house plants do not need a lot of fertilization. Others disagree. Flowering or fruiting plants will definitely need to be fertilized, but I feel that you can really harm a plant from over fertilizing, so I don't fertilize as much as people say you should. A good mild fertilizer is Neptune's Harvest Organic fertilizer. It's concentrated, so it lasts forever and you can adjust the quantities easily. There are a few different ones. There's the fish fertilizer, the seaweed, and a combination of both. The difference between them is that the fish is better for fruiting or flowering plants, while the seaweed is better for foliage plants. You can use it indoors or outdoors. It's hard to over fertilize with this brand, but keep an eye out for yellowing and browning around the tips of leaves, which is a sign that a plant has been overdosed.

## Here are a few different houseplants in particular that are known VOC reducers.

### **Boston Fern (*Nephrolepis Exaltata* “*Bostoniensis*”)**

Origin: Tropical Regions Worldwide.

Light: Semi-sun.

Water: Do not let roots dry out! Keep evenly moist and mist regularly!

Humidity and Temperature: Likes high humidity and temperatures ranging 50-75F.

Tips: Try keeping it in a sunny location in your bathroom near the shower.

### **Dwarf Bananas (*Musa Cavendishii*)**

Origin: Tropical Asia and Western Pacific.

Light: Full sun to semi-sun.

Water: Keep evenly moist; water less in the winter.

Humidity and Temperature: Likes warm, sunny, humid conditions 65-75F

Tips: Can fruit if given ideal conditions, but this is rare. The leaves are very delicate and will often tear.

### **Spider Plant (*Chlorophytum Comosum* “*Vittatum*”)**

Origin: South Africa

Light: Semi-sun to semi-shade.

Water and Fertilizing: Allow soil to dry out slightly between waterings.

Humidity and Temperature: Likes moderate humidity and temperatures ranging 55-75F.

Tips: Good in hanging baskets, buy make sure you rotate it, so it grows evenly. Propagates by sending out shoots with small plantlets that can be removed and potted, or left to grow on the mother plant.

### **Gerber Daisy (*Gerbera Jamesonii*)**

Origin: Southern Africa

Light: Full sun to semi-sun. Bright light is essential!

Water and Fertilizing: Keep evenly moist, but not soggy!

Susceptible to root rot from over watering.

Humidity and Temperature: Likes moderate humidity and temperature ranging 45-65F.

Tips: Midday direct light may prematurely age blooms. Will flower all summer outdoors, and will continue to bloom through the winter if brought indoors in the fall.

### **Anthuriums (*Anthurium Andraeanum*)**

Origin: Colombia.

Light: Semi-sun.

Water: Keep evenly moist; water less in the winter.

Humidity and Temperature: Likes warm and humid conditions 65-75F.

Tips: Similar to Peace Lilies, but a little harder to grow because of their humidity requirements. Does not like to be misted! Try planting in water.

### **Lily Turf (*Liriope Spicata*)**

Origin: China and Japan

Light: Semi-sun to semi-shade.

Water and Fertilizing: Keep evenly moist.

Humidity and Temperature: 60-75F

Tips: Commonly used for outdoor landscaping. Propagates by sending out “runners” from its roots.

### **English Ivy (*Hedera Helix*)**

Origin: Asia, Europe, and North Africa.

Light: Semi-sun to semi-shade.

Water: Allow soil to dry out slightly between waterings.

Humidity and Temperature: Likes moderate humidity. Does not like high temperatures 50-70F.

Tips: Will benefit from being outdoors in the spring and summer. Exceptional at removing formaldehyde. Loves to be misted! Can be very invasive when planted in the ground. Use in hanging baskets and topiaries!

### **Croton (*Codiaeum Variegatum Pictum*)**

Origin: Sri Lanka, Malaya, and Southern India.

Light: Full sun to semi-shade.

Water and Fertilizing: Keep evenly moist; water less in the winter.

Humidity and Temperature: Likes warm, sunny, humid conditions 65-80F.

Tips: Does not like sudden changes in temperature! Mist regularly to help with humidity.

### **Lady Palm (*Rhapis Excelsa*)**

Origin: Southern China.

Light: Semi-sun.

Water: Keep evenly moist and mist regularly.

Humidity and Temperature: Likes warm and humid conditions 60-70F.

Tips: Leaves will turn brown and dry out if there's not enough humidity.