



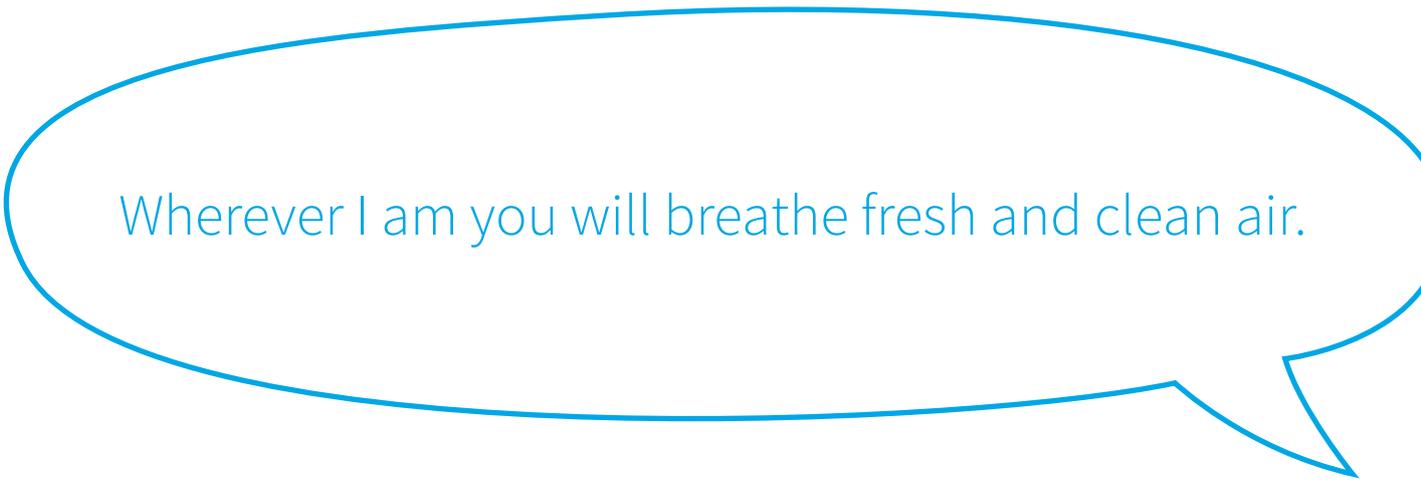
English version

Air up Your Life

A journey through the world
of air-cleaning plants



Karin Riesterer



Wherever I am you will breathe fresh and clean air.

welcome

#airyplanet



to AIRY

Breathe freely

This brochure provides information on which plants do a world of good and how you benefit from them best – in five steps.

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Dear Reader,

We all know pictures of big cities shrouded in a cloud of smog and the tight feeling in the chest at the sight of rainforests being cleared. Air pollution is one of the biggest challenges of our time. What only few of us know is that the air inside our homes and offices is polluted as well. In many cases even a multiple of the pollution along main roads. Construction materials, carpeting, paint, furniture, printers, computers, detergents and care products are the cause for disease-triggering pollutants.

But what to do? In many buildings, it is not possible to open the windows and let some air in – and it would be hardly of any use since the pollutants are emitted constantly. In fact, the one and only sustainable and efficient remedy is: *the plant*. Plants purify the air – this has become common knowledge. But how and with what? The American National Aeronautics and Space Administration NASA discovered that this, for us vital process, is happening up to 90 % in the roots of plants. The requirement for this to happen is to aerate the plant's roots. In other words: Until now we are taking advantage of this potential, which our plants are offering, only by a mere fraction. Therefore, we invented AIRY – our internationally patented plant pot which ventilates the root system. This plant pot converts your indoor plant into an air cleaner which is 100 % efficient – the 'green lung' of your living and work spaces.

AIRY works for you – for you not to run out of puff.



Peer-Arne Böttcher



Helge Knickmeier



**Happy Weeping fig
in AIRY model 'hot chili'**

01

The air

What do we actually inhale with each breath? → 10

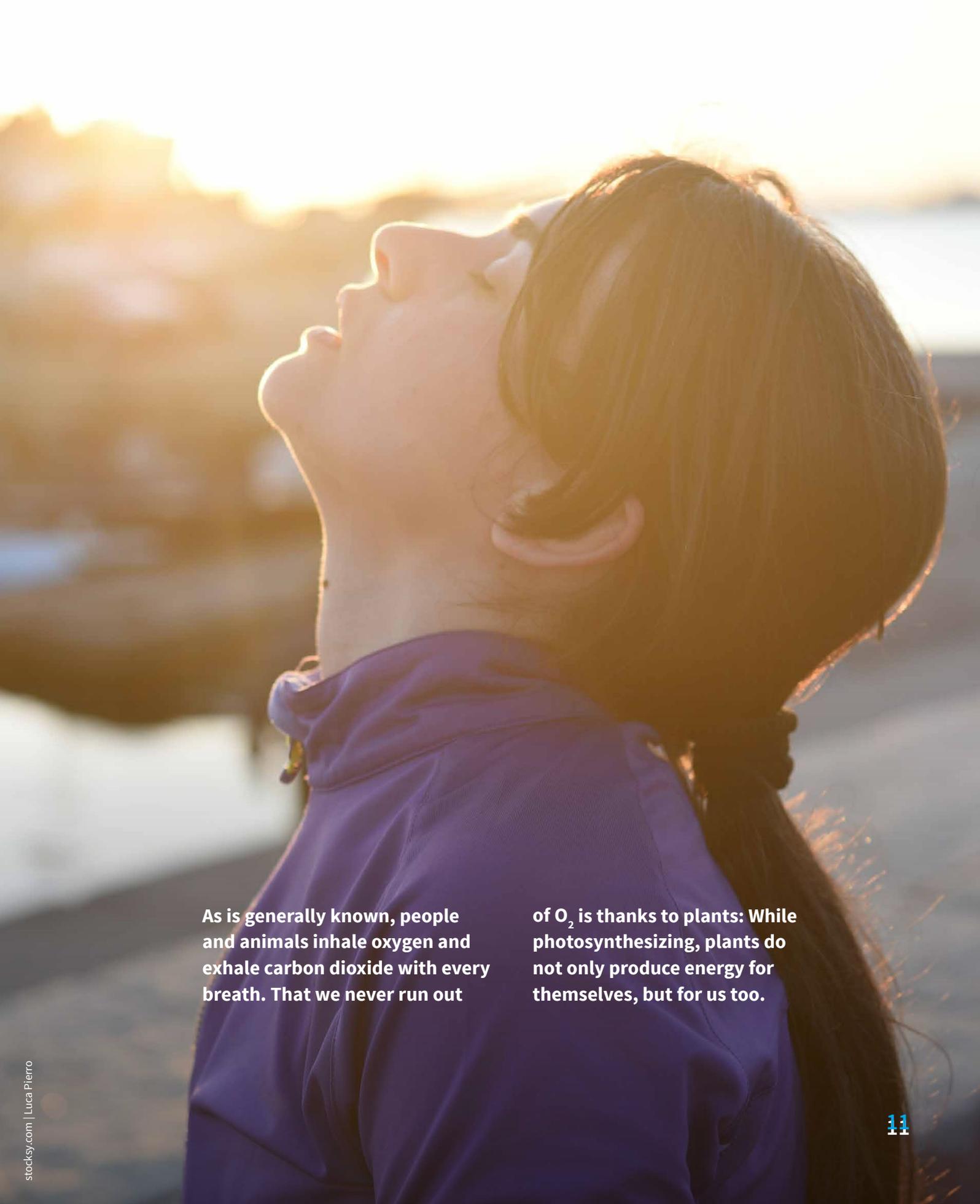
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What do we actually inhale with each breath?

When the air is clean, you would neither see nor smell nor taste it. Air contains about 78 % of nitrogen gas (N_2) and 21 % of oxygen gas (O_2). The remaining part of 1 % is composed of tracers of which the concentration may vary: from noble gas argon (Ar), carbon dioxide (CO_2), hydrogen, aqueous vapor to a whiff of other gases.



stocksy.com | Trinette Reed



As is generally known, people and animals inhale oxygen and exhale carbon dioxide with every breath. That we never run out

of O₂ is thanks to plants: While photosynthesizing, plants do not only produce energy for themselves, but for us too.

Photosynthesis – what does that mean exactly?

The word *Photosynthesis* has its roots from the Greek (*phōs* = light, and *synthesis* = put together). Photosynthesis takes place in certain plant cells which are located, above all, in the plant's upper and green part and contain chloroplasts. Chloroplasts then again are organelles, i. e. small organs, that also generate chlorophyll (from the Greek *chloros* = green). Sometimes only a few, sometimes hundreds of chloroplasts are located in one cell. One chloroplast is just about the size of 5 to 6 μm (micrometers). On the following page, you can watch such a tiny little thing at work.

Air is not really luxury, is it?!

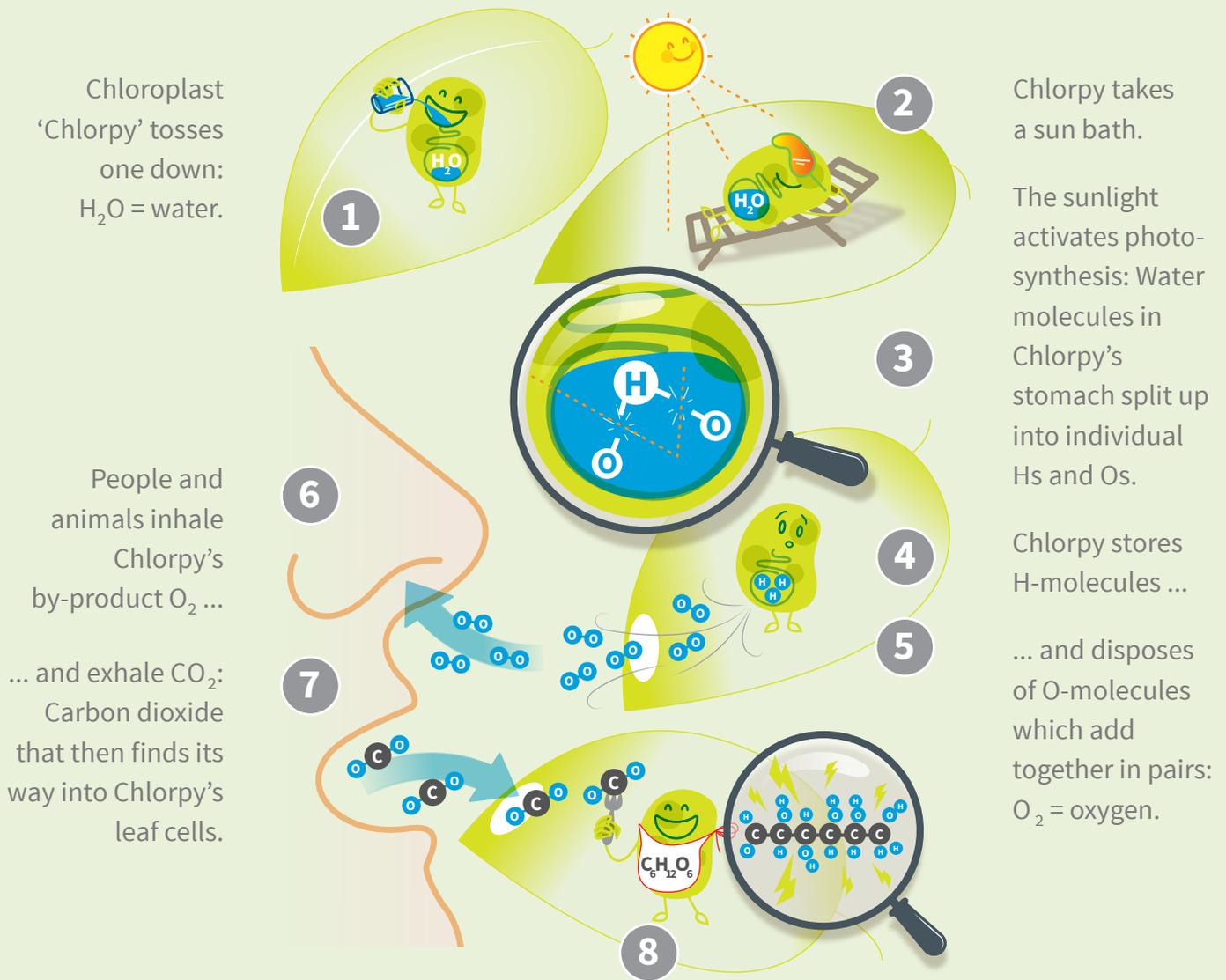
In fact, clean air is. However, there is good news: In many European cities, the air has become cleaner again, even though not good enough. Those who live in a metropolis or near a busy street, may turn up their nose at the outside air and would rather keep the windows shut than let polluted air in. But the air certainly finds its way into the room from the outside.

Which does not mean that the air inside is similar to the air on the other side of the door. And this leads us to the unpleasant piece of information: The air quality is particularly bad where most of us spend 90% of our time – namely indoors.

Why does it smell so strange in here?

'It is a lack of oxygen' many complain, when air smells stale indoors – and usually make a wrong diagnosis: In a sealed room of about 20 m^2 , there is sufficient O_2 for one person for days. The reason for stale air in the office, classroom or living room is not a lack of oxygen – even colleagues, fellow students or the roommate are not at fault. No, it is an excess of toxins that takes our breaths away.

Chloroplast at work: Der wichtigste Prozess der Welt



What bustles about in our rooms?

Wherever people are, they inevitably breathe, work, cook, clean, sleep and perspire. In doing so, they incessantly release carbon dioxide to the air. If the air is not ventilated regularly, CO₂ pollution is going to increase distinctly. Above all though, the concentration of pollutants in unventilated rooms may smell strangely, make us tired and sick. Measurements revealed that the indoor air contamination with toxins is eight times higher than in the outside air! Some pollutants find their ways from the outside into our indoor air. Many, however, originate from materials inside our rooms. We inhale evaporations of household detergents, paints and varnishes, adhesives, carpeting and furniture, which have been emitting toxins for years. You would like to know what these toxins are? Here we go: fine dust, carbon dioxide, nitrogen oxide, VOC (volatile organic compounds), allergens and mold spores.



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Fine dust emits from exhaust pipes and smokestacks – main polluters are industrial facilities and road traffic. Conditioned by air exchange, particles come in, and even inside the homes particles release – especially when cooking or heating. When you use electronic equipment, light a fire in a fireplace, light a candle or cigarette, fine dust develops.

Formaldehyde is a colorless gas that smells pungent and mostly occurs indoors. Increased concentration stings the airways and mucosae of the nose and eyes. Formaldehyde can release from natural substances such as timber or fruit and is used as a chemical element in many products.

Carbon dioxide is a gas that is emitted when burning gasoline, coal, wood, gas or candles. We are incessantly exhaling CO₂ into our ambient air. You will become immediately aware of an increased concentration of carbon dioxide in the air: Fresh air smells different.

Nitrogen oxide is a highly irritant gas. High concentrations were measured in road traffic; particularly diesel-fueled vehicles emit lots of NO₂. Gas, wood and other fuels that can be burned in fireplaces as well as candles and cigarettes emit nitrogen oxide indoors.

VOC (volatile organic compounds) evaporate from liquid and solid materials or emit at low room temperatures in form of gas into the air and irritate skin and nose. VOC develop in the nature (e. g. as methane in marsh districts) and escape from all living creatures. Countless products that we use in our everyday life emit these substances. You can find them as fat solvents in household detergents (in form of aliphatic hydrocarbons); or they occur as circular hydrocarbons which degas from paints and adhesives. Hydrocarbons, alcohols, aldehyde, organic acids, solvents like benzene, toluene, xylene, liquid fuels and synthetics belong to VOCs. In chapter 2 you can read where they originate from and what they can cause.



First, let some air in

It smells of stuffy at your workplace and of new sneakers at home? Those who take air fresheners or other deodorizers only conceal the bad air and add insult to injury.

In some buildings, air seems to be consumed quicker than in others. That could be the result of an Energy Conservation Ordinance. They take care that houses are planned, built, renovated and heated in ways that reduce energy demand. Well done! It relieves the environment and saves us costs. The result: Due to sophisticated insulation and extra sealed windows and doors, the air becomes quickly stale. The best first-aid measure is: Ventilate your rooms frequently and thoroughly.

Tip: A smart air change

You simply tilt your window in order to get fresh air? Wait a minute.

Ventilating a room works like this:

Open the wings of your window widely, preferably every two hours – at least four times a day. After five to ten minutes, the inside air has entirely exchanged. The colder the outside, the speedier fresh air gets inside your rooms. Should you just tilt your window, however, the exchange takes you up to one hour. Thereby, heating energy gets lost in winter. Additionally, the wall near the window might cool down and become prone to moisture.

A family of fours produces ten liters of water every day by showering,

cooking, and breathing. The evaporated water takes hold of cold spots. The thing is, walls that are moist are perfect breeding grounds to mildews that cause allergies and serious damage of liver and kidneys.

Once you ventilate your rooms properly, you get rid of moisture and toxins.

- In the morning, ventilate your indoor area to get rid of transpired air of the night.
- Ventilate your rooms thoroughly at noon again.
- Then again in the early evening at the latest – first and foremost to lower the CO₂ content.
- Finally, let fresh air in your home before you go to bed.

02

The room

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Why of all things do we examine indoor air?

There are exactly two reasons: Most of the time – day and night – we are indoors. And as couch potatoes we are unfailingly at the ‘source’. That means we are always surrounded by those materials which emit toxins. Some environmental toxins come into buildings from outside, most of them, however, are brought in by people or are produced by ourselves in our own homes.

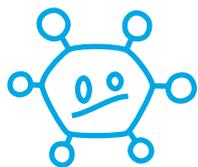
How do I recognize air pollutants indoors?

Let us take formaldehyde for instance: If there is too much of it in the air, a pungent odor will irritate your nose. The toxic and colorless gas is highly concentrated and is contained in tobacco smoke. It also develops when burning wood, coal or gas. As a basic chemical, formaldehyde is used in many products: synthetic materials, foams, glues, textiles, household detergents and cosmetics – sometimes even in disinfectants for food.

The tricky part of many pollutants is, however: You can neither smell nor see them – but they are in the air we breathe, contaminating it and thus the organism as well. Only when symptoms occur, you start pondering – why am I always coughing? Why do my eyes tear permanently? It is somewhat strange – why do I feel tired all the time?

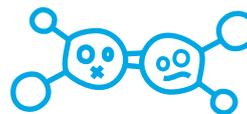
Wanted: Any kind of evildoer!

To pinpoint causes for such discomforts is not always easy. The inside air might be contaminated by organic pollutants, as well as fine dust, allergens, and animal hair. In order to find out the major sources for air pollution, we do not only need to know them, but we should be aware of how they get into the indoor air in the first place.



Benzene

You can smell it at any gas station: Benzene is to be found in gasoline, many colors and paints, in rubber and synthetic materials. Symptoms of intoxication are nausea, vertigo, headache, irritations of mucous membranes and skin irritations.



Trichloroethylene

This colorless liquid smells somewhat sweet; it is a component of printing ink, varnishes, household detergents (e.g. stain remover) and certain synthetic materials. Trichloroethylene causes irritations of mucous membranes and makes tired.



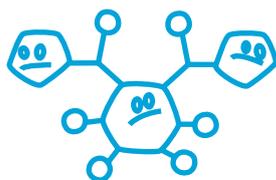
Formaldehyde

As basic chemical, it is a component of various products like stationaries, compressed wood and sealing of the soil surface. Formaldehyde also escapes when cooking on a gas stove and attacks the eyes and airways.



Toluene

Since this is a solvent, you may find it in colors and paints, varnishes, and gasoline. Toluene is also to be found in degreasing detergents, furniture polish and adhesives. It finds its way into the body through airways and the skin.



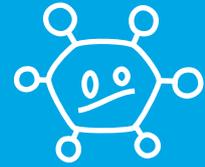
Phthalate

With the help of these plasticizers, brittle substances become elastic. They are to be found in synthetic materials, cosmetics and medicines. The toxin gets through the airways, esophagus and skin into the body.



Ammonia

It is used for manufacturing fertilizers and artificial resin. Moreover, it is to be found as an ingredient for glass cleaners. Even at a low concentration the pungently odorous gas irritates especially the eyes.



We literally inhale physical ailments. Substances that can be triggers for diseases escape from construction materials, furniture textiles, electronics and even children's toys. And please bear in mind: People's activities affect the quality of our surroundings as well. Especially, when you smoke, putter around in your basement hobby room or when you clean, cook or light a fire.



From where are pollutants released to the atmosphere?



Bedroom

Furniture, home and other textiles, soil sealing, wall covering

Living room

Television, stereo equipment, open fire, furniture polish, upholstery, parquet adhesives

Hobby room

Chipboard, paint, varnishes, glue, turpentine, paint remover

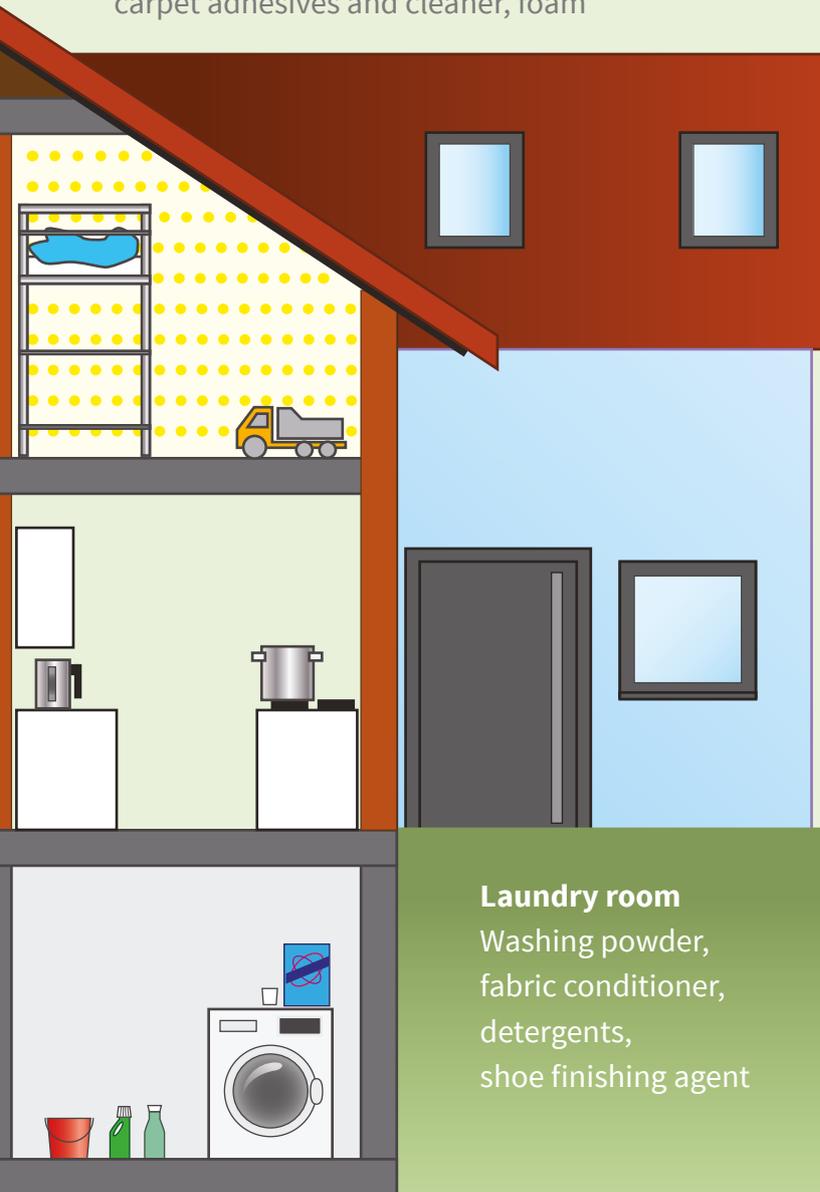
Bathroom and toilet

Cosmetics, deodorants, detergents, flooring, cigarette smoke, air freshener, sink



Nursery

Products made of rubber and plastics, carpeting, carpet adhesives and cleaner, foam



Study

Computer, printer, copier, insulator

Eat-in kitchen

Gas stove, microwave, oven cleaner, synthetic materials, wall paint

Laundry room

Washing powder, fabric conditioner, detergents, shoe finishing agent



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Who is particularly at risk?

Allergy sufferers and children are. Did you know that the metabolism of children is much faster than the one of adults? And that it is particularly sensitive to toxins? Children do not only sleep in their nurseries at night, they play and study in there at daytime as well. Should a child complain about headache, unexplained coughing or sleep disturbances, it could indeed be caused biologically (e. g. due to house dust mites or mold) or even chemically.

The younger the child, the higher is the risk. Little children explore their surroundings thoroughly and with all their senses. They even explore it by nibbling at all kinds of things – like their toys, which may contain tracers of toxic heavy metal! There are indeed limits (which are partially higher in Germany than given in the EU standards); nevertheless, we often expect too much of the body's defenses of our children regarding indoor air pollution and harmful toys on top.

What do the bad guys cause in our organism?

The symptoms are quite various. First and foremost, they affect the general condition: Many people feel tired and a lack of concentration in certain rooms. In addition they complain about headache, burning or tearing eyes, coughing, and irritations in throat and nose or skin rashes. Allergies, anemia and diseases of the bones and the lymph system may number among the symptoms as well. The emunctories, liver and kidneys are often affected too. Physicians summarized these unspecific ailments under the term *Toxic Home Syndrome*. It is simply meant to describe that certain health and comfort issues are linked to substances within or of a building that causes diseases. Usually, the complaints subside when the affected person leaves the building; however, they significantly increase again, when the same person returns.

Where should the air be absolutely clean?

Precisely there, where you spend most of your time: In your bed and at your job. When you let regularly fresh air in, decide on healthy furniture, textiles etc. and use soft cleaning products (you will find some tips concerning this matter on page 31), you will be able to keep the concentration of pollutants low or even lower them. However, possibilities that we have at home, are elsewhere often limited if not impossible.

Stinking cinemas or stores can be avoided, but not the workplace, classroom or hospital room, in which you are exposed to the environmental pollutants – every day and for many hours. Gases, fumes, dusts or smoke escape from machines, work materials and furniture. Moreover, some of the sources of pollution are permanently ‘built in’. Wall and floor coverings cannot always just be ripped out. Finally there are our indispensable electronic fellows and usual personal entertainers in our living rooms which, all together, deteriorate the air: computers, printers, photocopiers, laptops, TVs and stereos.

**Some household detergents
contain many health risks.**



Tip: Healthy cleaning

Household detergents often do more than they promised to. Besides cleaning, they even pollute the room air and irritate the mucous membranes. If one would only make use of some muscle power, water and good old cleaning advices like soft soap, contaminants could be eliminated and – both the environment and your health will thank you for it. Thousands of washing powders and detergents are available on the market, from oven sprays to WC cleaners; and the range for antimicrobial products is growing. And yet, these products should be banned from households whatsoever!

1. For ecological reasons, as some active agents carry on sabotage on bacteria in biological treatment plants for waste water. The water in rivers and lakes is at risk – eventually our drinking water.

2. Antimicrobial power cleaners are weakening our immune systems, since they eliminate benign bacteria while malignant bacteria become resistant and multiply.

Rather reach for unscented vinegar-based or neutral cleaners. They are biodegradable and do not harm the mucous membranes and environment. Just a dash is sufficient.





Is it actually possible to get rid of air pollutants?

Even if you spend most of your time in bad sort, the answer is: yes. You can make sure that at least a large part vanishes in an easy and comfortable way. And fortunately, there are not only annoying roommates establishing themselves in your environment but also extremely pleasant ones – that is to say plants. Some of them are able to perform small miracles. You can read in the following chapter, how exactly sansevieria, spathiphyllum and suchlike filter the air.

Tip: Low-emission furnishing

Pardon me? My couch is making me sick? In fact, that could well be the case. Upholstered furniture host dust, mites, microorganisms and tiny solids and you probably lie or sit on it every day. At that, tiniest fibers swirl up and through the room. For upholstery materials and other textiles, there are plenty possibilities of synthetic finishing available, which are destined to increase the comfort in terms of washability, resistance to staining and abrasion resistance. For this, formaldehyde is used, which was classified as carcinogenic by WHO long ago. And what about table, shelf, cabinet and bed? It depends on the material they are made of. Materials like chipboards or lumber-core plywood normally contain lots of

glues, from which formaldehyde or alternatively related isocyanate escape into the air. In addition, chemical solvents are used in many lacquers, oils and waxes for furniture. Those can be extremely durable and can, depending on their concentration, cause irritations of the mucous membranes right up to chronic damages to health. A string of eco-seals ensures us that we are on the safe side when furnishing. They label low-pollutant and pollutant-free home textiles and furniture made of sustainable raw materials. These labels indicate whether the manufacturer dispensed with solvents, formaldehyde and plasticizers.

03

The plant

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The solution grows on windowsills

We emit CO₂ and absorb oxygen.
CO₂ against O₂ – a perfect cycle which
provides us with fresh air continuously.
Even if it is a matter of other waste,
the flora has the required expertise.



As is well known, the earth is in big trouble, since we are polluting it extremely. Fortunately, rescue greens everywhere - there are more than 400 000 plant species around the globe. Although they do not move an inch, they are quite active. Among them, true heroes are growing, which are even able to absorb toxins from the soil, water and the air.

03 _ The plant

Green liver

Plants take up pollutants via their roots and accumulate them in the leaves or stems. In the Philippines for instance, a plant species bio-accumulates nickel from the ground. *Rinorea niccolifera* prospers where the soil is rich in heavy metals; over the course of evolution it adapted genetically. And plants are able to absorb chemicals from contaminated soil. For example: Poplars clean the soil on a disposal site for chemical weapons and industrial waste in the U.S.

Green kidney

The University of Technology in Berlin, Germany has researched how plants are capable of transforming contaminated water into drinkable water. Mouse-ear chickweed, water milfoil and waterweed for instance can filter poisons, heavy metal and other pollutants from lakes, ponds, rivers and even rainwater. The plants have learnt how to transform toxic substances and are using them for growing.

Green lung

Rain forests (which are shrinking every single day) in Asia, Africa and South America in particular, but other forests too act like huge filters which clean the air from dust, pollution and harmful particles. Without trees, we could barely breathe – faced with so much traffic fumes, heat energy exhaust fumes and industrial pollution. What roadside trees are able to master for a whole town, smaller plants will be able to master for your apartment or workplace.

Space exploration

This is hardly a new discovery. In March 1788, the author Karl von Eckartshausens gave a speech *About the deteriorating air that we breathe, its harmfulness to human health and the way of improving the air quickly and easily*. 'The purest air flows out of plants.' He pointed out 'Furthermore, people know that plants purify the air.' This was proved 200 years later: NASA researched how to clean the air in space stations for years. They found out that some plants are particularly talented.

Natural medicine

In order to explain what a potted plant is able to achieve in space stations or living rooms, we will take a short trip around the globe: Rotting gases are developing around the world. Their concentration and composition depend on the geographical location and the nature of the soil. These gases are mainly hydrocarbon compounds. In order to grow soundly in their environment, plants form enzymes which break down toxic substances.

What was initially meant to be a protective function became a utility function over the course of evolution. Plants gain products out of the degradation of poisons for their own metabolism (viz. nourishment); the remainder is being released into the environment.

Since rotting gases vary distinctly, originally identical plants developed subspecies that remove toxins in differing intensity.

Room service

Pollutants that pollute or even poison the air are quite frequently hydrocarbon compositions as well as rotting gases which are found in the nature. If you would like to breathe freely indoors, you just need to get the right plants. They fulfill requirements of ‘amazing chemists’ which produce lots of useful substances from the most deleterious ones. Species, which verifiably are able to purify the air, originate mostly from tropical or subtropical areas of rain forests. In rain forests, the roots of many plants are very flat in the soil and open right up into the air in order to reach for nutrients.

Foliage

The green air purification takes place in two ways: At the underside of the plant’s leaf, there is a stoma, which usually serves the exchange of CO₂ and O₂. Pollutants can get into the inner plant through these openings. There, enzymes break them down biochemically. Oxygen and otherwise nontoxic metabolites are produced, which are then stored in the cell walls in form of organic acids, glucose etc. That means: Plants that clean the air do not poison themselves, but they nourish themselves with pollutants.

Root treatment

Far more efficient is the assimilation of toxins in the area around the roots of the plant: Soil bacteria as well as enzymes produced by hair roots split toxics up into nutrients. The root then absorbs the gelatinous mass. The study of NASA also showed that the plants purify the room air when their leaves were removed. However, it must be ensured, that sufficient air gets to the roots. But since this is simply not possible with conventional plant pots, we invented our AIRY pot. More on this from page 88.

Watch out! Plants?!

Hold it! Are indoor plants not even unhealthy as the potting soil is a breeding ground for mold and fungal spores than get into the air? That is not going to happen, as long as you take care of them properly: Please do not use chemical fertilizers but organic fertilizers and do not water them too much. By the way, hydroponics do not supply safe protection: Mold thrives here in hiding.

Only a healthy plant is able to clean the air perfectly. If you watered your plants a little too much and discover traces of mold on the soil, we highly recommend turning your back on chemical mace and reach for tea. Already in the land of the Inca it was known as remedy: Take two teaspoons of the inside of the outer bark of the lapacho tree and brew them with 500 ml of water, leave to infuse and let it cool down. Spray the affected surface of the substrate with the tea – the fungicidal effect becomes visible within 48 hours.

Savior with roots

Should someone suffer from the Sick Building Syndrome or just from bad air, she/he can plant one or more air purifiers and place them on the windowsill.

Who are the heroes in our pots? Voilà:

On the following pages, we will show you the plants, which are able to filter the air especially well.

**De-polluting
(based on scientific
evidence)**



	Benzene	Formaldehyde	Trichloroethylene	Xylene	Toluene	Ammonia
Broadleaf Lady Palm		X		X	X	X
Chinese Evergreen	X	X				
Cornstalk Plant	X	X	X	X	X	X
Devil's Ivy	X	X		X	X	
Dragon Tree	X	X	X	X	X	X
Dwarf Umbrella Tree	X	X		X	X	
Flamingo Flower		X		X	X	X
Fruit Salad Plant		X				X
Gerbera Daisy	X	X	X			
Golden Cane Palm		X		X	X	
Ivy	X	X	X	X	X	
Miniature Date Palm		X		X	X	
Month Orchid				X	X	
Snake Plant	X	X	X	X	X	
Spathe Flower	X	X	X	X	X	
Spider Plant		X		X	X	
Sword Fern		X		X	X	
Weeping Fig		X		X	X	X

Broadleaf Lady Palm

Raphis excelsa



Southern Asia



bright to semi-shade



not below 15 °C (60 °F)

Family: *Arecaceae* (palm family)

Name: 'The Lady Palm'

APPEARANCE & PREFERENCES

South China, Thailand and Vietnam are originally home to this palm. Its fan-like fronds that have four to ten leaves each are dark green or variegated and become up to 30 cm long. Lower leaves are going dry by and by – that is normal. The plant vegetatively reproduces by hypogeal rhizomes, that is why older specimens often look like little clusters of palm trees. Its trunks become about 3 cm thick only.

In South Asia, the Broadleaf Lady Palm thrives in the understory, it is no surprise though that it does not like to be exposed to the blazing sun. Should strong light irradiation plague the plant, its leaves will turn yellow.

Raphis excelsa grows fairly slow and gradually stretches up to 150 cm in height. It has got a soft spot for fresh air and high

humidity. Above all, in the winter it likes to be sprayed frequently but watering should be moderate. Apart from occasionally appearing spider mites, pests are barely able to harm them.

SKILLS

The Broadleaf Lady Palm is air conditioning and filter in one. Like many palms, it is perfectly suitable for offices where it disposes of xylene and toluene (from printers and photocopiers) and formaldehyde.

Chinese Evergreen

Aglaonema modestum



APPEARANCE & PREFERENCES

Aglaonema owes its botanical name to its shiny filaments: *agláoos* is the Greek word for superb, *néma* means thread. These perennial herbs originate from Southern China, Northern Thailand, and Northern Laos. They grow only in tropical regions as adornments in the garden or park – therefore, they also appreciate high room temperatures.

Numerous upright-growing indoor plants rank among this genus. They grow up to 50 to 60 cm high and are patterned ornamentally. The species *modestum* attracts attention by its curly and wax-like leaves.

Chinese Evergreens like to be placed in semi-shade, they will not even take offense at shady locations and the leaves disagree with direct sunlight. However, you can coddle this plant with warmth. In order to keep the air



Southeast Asia



semi-shade



around 27 °C (77 °F)

16–20 °C (61–68 °F) at night



toxic for cats

Family: Araceae (aroid family)

humidity at a comfortable level you should spray the leaves with water or place bowls filled with water near the plant pot. During the main period of growth, the shrub should be provided with lukewarm water regularly, during the winter, it should not be watered that much, and in its dormancy period, it should get just enough water so that the soil does not dry out entirely.

SKILLS

The beautifully marked leaves of *Aglaonema modestum* increase the charm of every room and, additionally, the power of its roots lower, for example, the benzene concentration in the indoor air.

Cornstalk Plant

Dracaena fragrans massangeana



Tropical Africa



bright to semi-shade

20–22 °C (68–72 °F)



not below 16 °C (61 °F)
during winter



toxic for cats

Family: Agavaceae (agave family)

APPEARANCE & PREFERENCES

Cornstalk Plants found their way into our living rooms and offices from East and West Africa. It belongs to the genus of *Dracaena* that comprises about 140 species. In its homeland, this erect and slowly growing shrub grows up to 8 m high and forms several stems. The original green-leaved species are rarely cultivated in Europe – ‘massangeana’ is quite popular with its yellowish/green central stripes. Cornstalk *Dracaena* feels particularly at home in the bright light – however, this is not the case in the direct midday sun; green species thrive even in shady locations. It cannot cope with wetness; *Dracaena fragrans* prefers to be kept moderately moist. Experts are either spraying their plants or frequently wipe their leaves with damp cloth. With the appropriate care, this

dracaena is very resistant to pests; under drought conditions, however, it is prone to scale insects. Embrowned leaf tips (which you can remove with a scissor) may indicate to parched root balls or they could even be a sign of draft or an excess of fertilizer.

SKILLS

‘Massangeana’ is being counted among the ‘top air fresheners’ – it is especially effective in absorbing formaldehyde.

Devil's Ivy

Epipremnum aureum



APPEARANCE & PREFERENCES

Devil's Ivy is to be found in Southern Asia, Australia and Oceania. In nature, the plant climbs up to a height of 20 m; this is quite seldom the case regarding our rooms. Heart-shaped leaves grow on shoots; the leaves are colored and irregularly patterned in light green and golden yellow. Leaves of young plants are delicate; the ones of older plants measure up to 50 cm by 40 cm. *Epipremnum* twines its shoots around climbing aids or just let them hang down: Also as a hanging basket plant it is quite attractive.

Devil's Ivies appreciate neither direct sunlight nor drafts. Otherwise it is an adaptable plant and endures even at shady places (in this case, however, they would forfeit their beautiful patterns). It feels most comfortable at bright east and west-facing



Southeast Asia



semi-shade to bright



not below 14 °C (57 °F)



toxic for children and pets

Family: Araceae (aroid family)

Name: Golden pothos, hunter's robe, money plant, taro vine, silver vine, and Solomon Islands ivy

windows and evolves magnificently when it is granted permanently moist soil and high air humidity: That is to say, avoid water-logging and dry root bales and spray them frequently.

SKILLS

The professional climber is an indispensable roommate for smokers since it filters pollutants from tobacco smoke. By the way, Devil's Ivy can also be rooted into freshwater aquariums where it absorbs phosphates and nitrates from the water.

Dragon Tree

Dracaena marginata



Madagascar



sunny to semi-shade

20–23 °C (68–73 °F)



not below 16 °C (61 °F)
during winter



toxic for dogs and cats

Family: *Asparagaceae* (asparagus family),
or *Agavaceae* (agave family)

Name: Red-edged *Dracaena*

APPEARANCE & PREFERENCES

There are more than 100 different kinds of Dragon Trees. This one originates from Madagascar and is, since of late, no longer an independent species but counted among *Dracaena reflexa* (var. *angustifolia*). Since the plant is still sold under its former botanical name, we decided to call it in this description ‘*Dracaena marginata*’ as well. The plant has shiny dark green leaves which are edged in wine red. They resemble fleams: They are 20 mm slim and 30 cm to 40 cm long. After several years of careful maintenance, dragon trees are looking like palms; they are, however, not trees and closer related to lilies of the valley than to palms.

Dracaena marginatas prefer a sunny to semi-shade spot, like to stay on the balcony or patio during the summer; if so, it should

be allowed to get used to sunlight gradually. Incessant rain is not its favorite weather and at temperatures below 10 °C (50 °F) it will be pleased to move back inside the house. Benevolent plant owners take care that it does not dry out and keep the plant moderately moist.

SKILLS

Dragon Trees are pretty air purifiers for all eventualities. Should benzene pollute the air, they are the ideal partner.

Dwarf Umbrella Tree

Schefflera arboricola



APPEARANCE & PREFERENCES

Schefflera arboricola originates from the islands Taiwan and Hainan. Like many indoor plants it is an imposing tree in its homeland. Its name 'Dwarf uBrella Tree' implies that it resembles the umbrella tree in a 'dwarf version'.

This exotic plant tolerates semi-shade but prefers rather bright spots without direct sunlight. It is not frost-hardy and, therefore, cannot cope with temperatures below 10 °C (50 °F) without shedding leaves; thus it is best kept at room temperatures all year long.

Although the plant originally thrives in wet forests and riverbanks, it does not require much water in a pot; the soil should not be wet constantly. Apart from that, *Schefflera arboricola* is considered a robust plant that is even able to cope with dry heating air. It



Taiwan



bright



never below 10 °C (50 °F)



irritates skin and mucous membranes

Family: Araliaceae (aralia family)

grows abundant 30 cm a year. If it becomes too big, you can prune it easily – preferably in spring.

SKILLS

Those living together with a Dwarf Umbrella Tree, will benefit from its ability to purify the air of formaldehyde, tobacco poisons and other pollutants.

Flamingo Flower

Anthurium andraeanum



Central and South America



bright



19–23 °C (65–75 °F)



slightly toxic

Family: Araceae (aroid family)

Name: Tailflower, laceleaf

APPEARANCE & PREFERENCES

Tropical Central and South America, as well as the Caribbean are home to this beauty. It has rich green leaves that grow up to 40 cm long and resemble the longish shape of a heart. Above, little birds seem to hover: inflorescences with yellowish spadix whose husks shine white, salmon or dark red. In order to produce appealing and durable blossoms, the Flamingo Flower does not require direct sunlight; nevertheless, it requires a bright spot throughout the year. Should the light turn out to be insufficient, its leaves are becoming long and squarrose. Flamingo Flowers appreciate constant temperatures. In order to stimulate flower formation, it may be placed at a colder (about 15 °C/60 °F) – but not darker – spot for six weeks. During this period, please do not fertilize, and water moderately. During the

main phase of its growth, on the other hand, keep the root ball moist regularly and the humidity high (60–65%): Please water frequently and spray your plant with lime-deficient and lukewarm water every day.

SKILLS

With sufficient care, Flamingo Flowers can take it up with pollutants of all possible kinds. It is especially skillful at reducing ammonia.

Fruit Salad Plant

Monstera deliciosa



Mexico



bright to semi-shade



around 20 °C (68 °F)



slightly toxic

Family: Araceae (aroid family)

Name: Monster fruit, Windowleaf,
Mexican breadfruit

APPEARANCE & PREFERENCES

In their homeland Mexico, Fruit Salad Plants attach to giants of the jungle by their aerial roots climbing towards the sun in up to 20 m height! In other lines of latitude, this climbing shrub grows, after all, to a height of 7 m.

Whether in the office or living room, *Monstera deliciosa* draws all eyes to it. The heart-shaped rich green leaves of the plant adapt to the light conditions (like in the rain forest). It forms large leaves which have just a few incisions so that it can make best use of spare light in the shade. The lighter the location the more the plant tends to incisions: Exposed leaves are profusely fenestrated, that is to say, they have a lot of deep incisions. Only older specimen blossom: They form fragrant spadix which are shrouded by yellow – later by purple

and white husks.

Monstera deliciosa demands light but deprecates summer sun. Temperatures below 18 °C (64 °F) should be avoided. However, high air humidity as well as slightly moist potting soil is much appreciated – you can also do it a favor by wiping this beauty's leaves every now and then in order to keep its stomata free.

SKILLS

Fruit Salad Plants purify indoor air of all kinds of pollutants – it has not specialized in certain toxins so far.

Gerbera Daisy

Gerbera jamesonii



South Africa



bright



18 °C (64 °F) during daytime

10 °C (50 °F) at night



nontoxic

Family: Asteraceae (daisy family)

Name: Barberton daisy

APPEARANCE & PREFERENCES

Nearly 300 years ago, it became popular and was named after the German student of nature 'Traugott Gerber' (1710–1743): Gerbera. Roughly 30 species are decorating the nature of Africa and Asia; most of them are prevalent in South Africa – among them 'Barberton daisy', our 'jamesonii'.

This shrub with its velvet leaves is usually sold as cut flowers; fortunately, since the 1990s it is offered with roots as well:

As an indoor plant, Gerbera gives us a treat throughout the year – with its blossoms in white, yellow, orange, red, pink and purple. Nevertheless, you should pamper your gerbera with plenty of light, but please avoid exposure to direct midday sun, otherwise it withers quickly. It does not tolerate high temperatures; dry and warm air predisposes to greenflies. Regular watering on the

contrary does the plant good and makes sure that it is blossoming year-round. Its potting soil should never dry out completely; during the winter, it is absolutely sufficient if you water your Gerbera Daisy moderately and bi-weekly. In the course of the cold months, your plant recovers at temperatures between 8 °C and 12 °C (46 °F and 54 °F).

SKILLS

Gerbera Daisy was one of the first plants to be tested on its ability to clean the air. The result of NASA: highly efficient.

Golden Cane Palm

Dypsis lutescens



APPEARANCE & PREFERENCES

In order to avoid any misunderstandings: *Dypsis lutescens* was formerly referred to as 'Chrysalidocarpus' and before that 'Areca lutescens'. This popular indoor plant originates from Madagascar and the Comoros. There, it is still growing along rivers and in wet forests but is unfortunately on the brink of extinction.

Golden Cane Palms usually form several stems which grow up to 10m high in nature – with a diameter of 5 cm to 7.5 cm only. This palm can be easily distinguished from other palms by its brown speckled slender stems. The crown consists of 6 to 8 leaves: These palm fronds are oval-shaped and beautifully bent. Thin little pinna are attached to 60 cm long leafstalks. *Dypsis*' demand for lime-free water is fairly high; root balls may also get wet, since water



Madagascar



bright to semi-shade



around 20 °C (68 °F)



nontoxic

Family: *Arecaceae* (palm family)

Name: Bamboo palm

is being consumed quickly. The palm likes light, but prefers semi-shade over direct sunlight. Strong light irradiation colors its leaves irreversible golden yellow – therefore its name: Golden Cane Palm. The tree appreciates warmth very much; even during the winter, it only feels comfortable with temperatures of at least 15 °C (59 °F).

SKILLS

Dypsis lutescens outgrows itself in its combatting of indoor air pollution. It is even able to store an excess of salt in certain leaves which then die (and should be removed fast).

03 _ The plant

Ivy

Hedera helix



Europe



bright



10–18 °C (50–64 °F)



slightly toxic to toxic

Family: Araliaceae (ivy family)

Name: English ivy, needlepoint ivy, and ripple ivy

APPEARANCE & PREFERENCES

The habitat of Ivy extends from Southern and Central to Western Europe where it preferably climbs trees and walls but also creeps along the ground. In ancient times, Ivy was worshiped as a sacred plant; since the 17th century it is cared for as a decorative plant.

The genus name ‘hedera’ derives from the Greek ‘hédra’ (sitting) which indicates the adhesive force of the plant: Shoots grow through aerial roots and stick to trees, walls or just to the ground. Five-finger-shaped leaves become diamond shaped after 20 years; its reddish/purple fruits gradually turn blue/black.

Ivy prefers a light spot without direct sunlight. A ‘green rule of thumb’ is: The darker the leaves the shadier the plant can be placed. It does not like warmth or dry air,

so that locations far from heat sources would be much appreciated, as well as a daily shower with lime-free water. Moreover, ivy appreciates neither too much nor too little water. It is to be watered when the surface of the soil gets dry.

SKILLS

Ivy purifies the room air and controls the air humidity for comfortable indoor climate, constantly: The evergreen professional climber can become up to 250 years old.

Miniature Date Palm

Phoenix roebelenii



Southeast Asia



bright to semi-shade

16–24 °C (61–75 °F)



not below 10 °C (50 °F)
during winter



nontoxic

Family: Arecaceae (palm family)

Name: Pygmy date palm

APPEARANCE & PREFERENCES

Miniature Date Palms are found in the north of Laos, Vietnam and in the South of China. They are rheophytes, that means they are rooted on riverbanks (above all, along the Mekong in Vietnam) or at places that are at least flooded from time to time.

In nature, this plant grows up to 250 cm high – as an indoor plant it grows rarely higher than 100 cm. Phoenix roebelenii grows slowly: It has got a short trunk which produces delicate fronds at the top that are rich green.

These palms require plenty of water and high air humidity: In their indigenous rain forests, they take a lot of humidity out of the air – this is a luxury that we certainly cannot provide in our rooms. When it is hot or the air is dry due to heating, you should water the plant sufficiently. Before watering,

however, the soil should be slightly dry on the surface. Should your Miniature Date Palm stay outside during the summer, a semi-shade spot would be perfect in order to prevent a sun scald; indoor it should not be exposed to scorching sunlight as well.

SKILLS

This date palm can cope with air pollutants effortlessly – wherever indoor air is strained with xylene, the Miniature Date Palm turns out to be a true giant.

Moth Orchid

Phalaenopsis



Southeast Asia,
Northern Australia



semi-shade



21–26 °C (70–79 °F)
during daytime

16–18 °C (61–64 °F) at night



nontoxic

Family: Orchidaceae (orchids)

APPEARANCE & PREFERENCES

Graceful is its shape – poetic its name: It is derived from the Greek phalaina (moth) and opsis (appearance). Blossoms are sitting on long stalks above leathery dark green leaves, like moths. Phalaenopsis is blossoming almost throughout the entire year – in white, pink, purple, red, yellow or crimson – sometimes plain colored, sometimes colorful patterned.

In indigenous rain forests in Southeast Asia, these orchids are spoiled by constant humid air and diffused light; in colder regions, you should ensure room temperature all year round and as humid as possible indoor air. Only in fall, it is advisable to place the flowers at a somewhat colder spot for about five weeks in order to encourage flower formation. During the summer, Phalaenopsis should be placed in semi-shade

locations, during the winter in bright locations but certainly not exposed to direct sunlight. Keep its potting soil moderately moist – before watering, the substrate should be just slightly dry, and take care that water is never pulled onto the plant, otherwise it may rot.

SKILLS

Moth orchids stand out by beauty and competence: They are able to filter toxic xylene from the air.

Snake Plant

Sansevieria trifasciata 'laurentii'



APPEARANCE & PREFERENCES

The name 'Snake Plant' derives from the shape of the plant's leaves. 'Mother in law's tongue' might be derived from its erect, pointed and sharp leaves: They can grow up to about 120 cm in height. With good care, you will be rewarded with delicate inflorescence that has a delicious fragrance, after several years.

Decades ago, *Sansevieria* was a guest in almost every living room. Then it went out of fashion but now celebrates its comeback: New admirers find that its graphically precise shape perfectly fits modern ambiances. Snake Plants even thrive at somewhat less than perfect locations; however, they have an aversion to draft. They rather get by with drought than with too much water. If there is a water level in the plant pot permanently, it may come down



Africa and Southern Asia



bright to semi-shade



21–24 °C (70–75 °F)

a bit lower during winter



toxic for dogs and cats

Family: *Asparagaceae* (asparagus family)

Name: Mother in law's tongue,
St. George's sword (in Brazil)

with root rot, which you can recognize by the leaves turning brownish. Apart from that, it is rarely afflicted by diseases or pests.

SKILLS

Sansevierias are resilient, purify the air of benzene and trichloroethylene, and since they do not form oxygen during the day but at night, the plant could, indeed, move into your bedroom.

Spathe Flower

Spathiphyllum wallisii 'mauna loa'



Northern America



saemi-shade to shade



16–24 °C (60–75.2 °F)
during daytime

13–20 °C (55–68 °F) at night



toxic for dogs and cats

Family: Araceae (aroid family)

Name: White sails, peace lily

APPEARANCE & PREFERENCES

Around the 1870s, the plant found its way from the tropic rain forests of Columbia and Venezuela to Europe and has conquered our windowsills ever since. Attached to each of their stems is one tapered dark green leaf. Flower spikelets, half covered with a petal-like spathe as white as snow, are enthroned on the stems. *Spathiphyllum* is therefore an attractive appearance which, in addition, blossoms regularly. Inflorescences last for weeks and gradually the white husks turn into a greenish color.

As *Spathiphyllum* is originated in the jungles it is in favor of warm and humid inside air. However, it does not tolerate direct exposure to the sun but enjoys it a lot to be sprinkled with lukewarm water from time to time (only sprinkle the leaves, not the petals.)

SKILLS

The plant is not only popular for its elegance and frequent blossoming (*Spathiphyllum* is, by the way, an easy-care plant and hardly prone to pests), but for its tremendous cleaning power which is extremely convincing: It filters the air to a large extent from formaldehyde, benzene and trichloroethylene.

Spider Plant

Chlorophytum comosum



South Africa



bright



13–24 °C (55–75 °F)



nontoxic

APPEARANCE & PREFERENCES

Out of numerous *Chlorophytum* species, you will meet *comosum* most commonly as house guests: Its slender leaves come with green and white stripes – between them, scape is growing up to 70 cm long and out of the scape’s tips, little white flowers blossom. At the sprouts of the flowers, perfect little plants develop – with leaves and roots. The stems bend gently downward under the weight of these suckers so that the young plant can root into the soil. These South African plants cut a fine figure and are, therefore, often planted on jardinières or in hanging baskets.

The leaves of Spider Plants can only develop remarkable color contrasts when it is placed at a light spot. In the conservatory, it can take a sunbath, however, during summer it should be shielded from midday sun. Green

Family: Liliaceae (lily family),
or Anthericaceae (sand lily family)

species of *Chlorophytum* are more robust: They thrive in sunny to shady locations. During the winter, *comosum* should be watered moderately and the upper layer of the soil should dry out a little, before watering it again. Otherwise the root balls stay slightly moist; nevertheless, water-logging should be avoided, as well as dry root balls. If the air is too dry, the substrate too wet, or if there is insufficient light, the tips of the leaves will turn brown.

SKILLS

Spider Plants earn rave reviews for disposal of formaldehyde.

Sword Fern

Nephrolepis exaltata



Polynesia, Africa,
Central America/Caribbean



bright to semi-shade



14–21 °C (57–70 °F)



slightly toxic for cats

Family: Lomariopsidaceae
(a family of Leptosporangiate fern)
Name: Boston fern

APPEARANCE & PREFERENCES

Botany is a difficult field. For that reason, the above mentioned definition regarding the family is somewhat uncertain. Perhaps *Nephrolepis* will be separated into another family (*Nephrolepidaceae*) again. However, be sure that ferns count among the oldest plants around the earth. They have grown on the earth since 400 million years – in the soil and as epiphytes on branch forks of rather big trees.

Nephrolepis exaltata is widely spread in Polynesia and Africa; it thrives in the insular Caribbean, Florida, and Mexico, throughout Central America and down to South America. Its growth height ranges between 40 cm and 90 cm, some specimens reach even up to 150 cm.

Within a room, Sword Fern is indeed suited as a hanging basket plant, since the leaves

are overhanging: Its decorative light green fronds can become 180 cm long. It likes to be placed bright to semi-shade and tolerates waterlogging just as little as dryness of the root balls. At warmer temperatures and low air humidity, your Sword Fern will highly appreciate to be sprayed with soft, luke-warm water every day.

SKILLS

Nephrolepis exaltata takes care of the climate in your rooms and is a true hero regarding removing air pollutants.

Birkenfeige

Ficus benjamina



APPEARANCE & PREFERENCES

Anyone traveling from Nepal to tropical Northern Australia through Northern India, Myanmar, and Malaysia will see Ficus benjamina along streets, in parks and gardens. Wherever neither ceiling nor cold temperatures prevent it from growing, the fast-growing, evergreen tree points up into the sky – often 8 m to 10 m high and it might grow even higher. Its bark is smooth and light gray; its crown wide spreading; little leaves adorn the Weeping Fig: Young leaves are light green and slightly curled. Older leaves are deep green and smooth. These trees prefer sunny to semi-shade spots – and permanent ones too: They do not like to move at all. Until a Ficus benjamina acclimates to a new place, it may drop some leaves. Its substrate should be kept moist but not wet. Water the plant



Southeast Asia



sunny to semi-shade



24 °C (75 °F) during daytime

15–20 °C (59–68 °F) at night



toxic for dogs and cats

Family: Moraceae (mulberry family)

Name: Ficus tree

moderately during the summer – and little in the winter. Then, in late winter or early spring, branches that are crooked or crossed over can be cut back so that the tree looks pretty.

SKILLS

If you do not reposition or repot your Weeping Fig constantly, it will show you its gratitude by healthy growth and effective elimination of room air toxins – formaldehyde in particular.



Extra: With all senses

They just stand there in quiet; they need some water from time to time; they rarely are in need of fertilizers or big pots. Plants are considered modest and hardly entertaining cohabitants, yet, they have amazing skills. The underestimated green stuff is able to distinguish different wavelengths of the light, thus it is able to see. It smells chemical messengers in the air and tastes nutrients of the soil. Moreover, it is able to perceive the wind, temperature and moisture and responds to it.

Owing to their sense of balance, plants always know in which direction to grow – the roots downward and the sprout towards the sun. Despite missing nerves, they can sense, when their leaves are nibbled at. This is made possible by xylems that – besides water and nutrients – pass on electrophysiological signals. Researchers presume that the plants' 'brain' is located in its roots.

→ Plant whisperers

Green creatures avert assailants by luring the enemy of their enemy by means of chemical messengers. They use scents for communication among each other as well – but not only. Experiments proved that roots are able to listen (in the form of sound waves). At least some plants communicate via acoustic signals.

In view of having such abilities to perceive, this leads to the question: Do plants possibly have feelings?

Cleve Backster (1924–2013) was convinced they have. A former employee of the U.S. secret service once attached his dragon tree to a lie detector barely 50 years ago.

He observed that the record almost resembled the one of people. Since then, Backster had tried to convince the world that even plants are capable of feeling gentle emotions. However, his commitment was not conducive to his career.

Be that as it may, avid plant owners pay particular attention to their beloved plants. Palms, orchids & Co. are thankful for a bit of loving care and reward you with lush growth and intensive air purification.

04

The human being

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Welcome to the bonsai wilderness

For many thousand years, mankind had stalked through the nature; within a short period of time they settled down, hunting on the internet and collecting bargains. At least we accommodate plants in our rooms. After all, the sight of plants indicates also in the 21th century: Something is prospering in here, there is water around, and one can live – or, at least, survive here. Scientists believe that our soft-spot for plants originates in our genes.



From the rainforest into the restaurant: Orchids feel quite comfortable here as well.

Indoor and outdoor plants

Apropos, even the old Romans used to put pot plants in their atriums. The first to decorate their interiors with plants, however, were the Chinese about 1 000 years ago. Then, a few hundred years later, explorers had brought exotic plants to Europe; initially they were kept in greenhouses and orangeries, whereas the culture of indoor plants has been blossoming in virtually every private household since more than 30 years now – thanks to the central heating.

Green makes you beautiful und does wonders

It is hardly possible to imagine public buildings without plants. Many public authority buildings, schools and hospitals seem pretty dreary without their green inhabitants, don't they? A few lush plants do not only look good at your workplace, they can also dampen sounds and serve as glare shield and room divider. That 'rooting beings' enhance our well-being completely has been shown by numerous studies from all over the world. We work with more commitment and feel less pressure with plants around. According to scientists, they have a beneficial effect on our body, spirit and soul.

Green gives energy and relaxation

Did you know that pupils and students can think more creatively and concentrate and learn more efficiently in rooms decorated with plants? And that people have a lower blood pressure and a higher capacity of reaction when they work with plants around – than people that do not? Moreover, their performances are 15% higher and they call in sick less frequently. Plants flourish inside; that is to say to the benefit of the company and its employees.

Green cures and cheers up

People who spend time indoors in the green complain less about tiredness, headache and skin irritations. Plants are even able to fight stress: Only their sight makes people relax within a few minutes – measurements of the blood pressure, muscle tension and skin resistance are clear evidence. Fear and other negative feelings relax as well. In hospitals it was shown that patients recover quicker when green areas or potted plants were within their sight.

Air condition – please, without electricity!

Indoor gardeners appreciate another talent of their ‘pot-inhabitants’: They are able to regulate the indoor climate. We usually perceive an indoor climate with an air humidity of 45 to 50 % as pleasant; it should not climb above 65 % or drop below 30 %. The latter can be difficult during heating period, as warm air absorbs more water vapor than cold air – room air dries out fast. And not only dries out the room air but the nasal mucosa as well, so that bacteria and viruses have an easy game.

This calls for experts:

Plants with delicate leaves of a large volume like dieffenbachia, fern, papyrus, philodendron, false banana, African hemp or Umbrella palm. They are vaporizing more than 90 % of the irrigation water and therefore increase the air humidity. Also during the summer, plants are increasing the comfort: By shading and vaporizing irrigation water, they cool down the indoor temperature.

MD Dragon Tree and colleagues

If apartment or office, factory or mall:
Health effects, that number among the
Sick Building Syndrome, often occur
indoors and are caused by a variety of
pollutants. Plants that proved especially
efficient in detoxifying the air can be found
portrayed on pages 43 to 61 – nothing
but decorative experts that develop their
capabilities to the full at the right location
and with sufficient care:

In living areas and kitchens

The following plants prefer east-facing or west-facing windows:

- Devil's ivy (*Epipremnum aureum*)
- Flamingo Flower (*Anthurium* sp.)
- Snake plant
(*Sansevieria trifasciata*)
- Spider plant
(*Chlorophytum comosum*)
- Weeping fig (*Ficus benjamina*)

North-facing windows are preferred by

- Dwarf umbrella tree
(*Schefflera* sp.)
- Fruit salad plant (*Monstera* sp.)
- Heartleaf philodendron
(*Philodendron* sp.)
- Ivy (*Hedera* sp.)
- Spathe flower
(*Spathiphyllum wallisii*)

South-facing windows are ideal for desert plants like

- aloe, yellow saxifrage,
a variety of cacti

In bedrooms

Greenery can find accommodation in here that absorbs carbon dioxide at night too

- Orchids
- Snake plant
(*Sansevieria trifasciata*)
- True aloe (*Aloe vera*)

In bathrooms

All kinds of plants are comfortable in the bathroom that appreciate warmth and high humidity

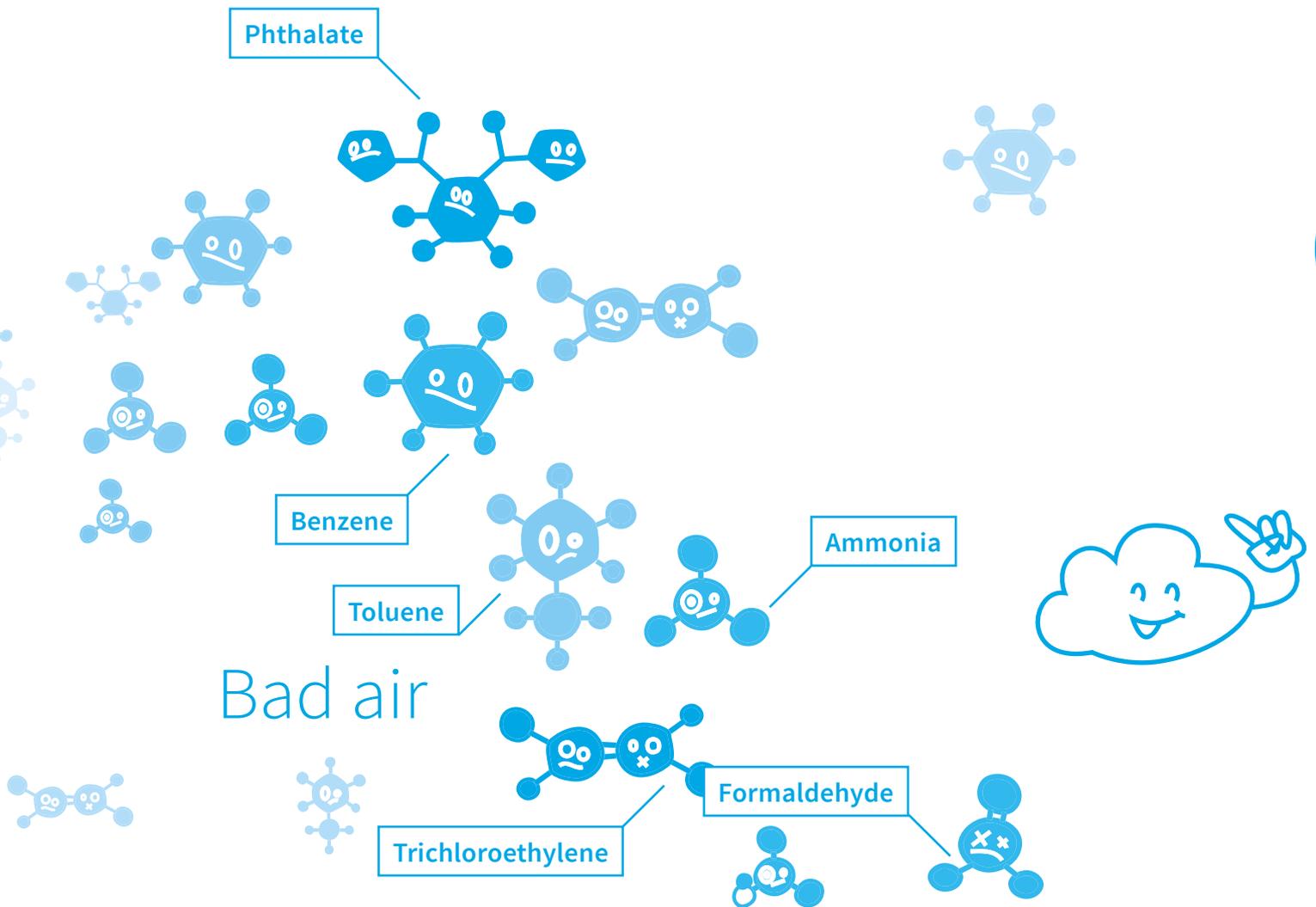
- Cornstalk plant (*Dracaena* sp.)
- Flamingo flower (*Anthurium* sp.)
- Orchids
- Spathe flower
(*Spathiphyllum wallisii*)
- Sward fern (*Nephrolepis exaltata*)

At the workplace

Copiers, printers and many other sources are responsible for pollutants. For the reduction of those, the following pollution controllers can be applied here:

- Chinese evergreen (*Aglaonema commutatum/A. modestum*)
- Cornstalk plant (*Dracaena* sp.)
- Devil's ivy (*Epipremnum aureum*)
- Dwarf umbrella tree
(*Schefflera* sp.)
- Flamingo flower (*Anthurium* sp.)
- Fruit salad plant (*Monstera* sp.)
- Heartleaf philodendron
(*Philodendron* sp.)
- Ivy (*Hedera helix*)
- Parlor palm
(*Chamaedorea elegans*)
- Snake plant (*Sansevieria trifasciata*)
- Spathe flower
(*Spathiphyllum wallisii*)
- Spider plant
(*Chlorophytum comosum*)
- Sward fern (*Nephrolepis exaltata*)
- Weeping fig (*Ficus benjamina*)

04 _ The human being



Top 'benzene removers'

- Cornstalk plant
(*Dracaena fragrans*)
- Devil's ivy (*Epipremnum aureum*)
- Ivy (*Hedera helix*)
- Parlor palm
(*Chamaedorea elegans*)
- Spathe flower
(*Spathiphyllum wallisii*)
- Parlor palm
(*Chamaedorea elegans*)

What flies around me in the air?

The eyes are itching or the head is aching when you are in a certain building or room? And the complaints disappear when you leave the room? When you sense that an intensive change of room air might be necessary, just pot one of our heroes; you simply cannot do anything wrong with that. Another way of solving the matter would be to have the air assayed for pollutants.

For more details, please have a look at www.airy.de

The most efficient 'formaldehyde removers'

- Dwarf umbrella tree (*Schefflera arboricola*)
- Heartleaf Philodendron (*Philodendron hederaceum*)
- Spider plant (*Chlorophytum comosum*)
- Weeping fig (*Ficus benjamina*)

Experts for general detoxification

- Broadleaf lady palm (*Raphis excelsa*)
- Fruit salad plant (*Monstera deliciosa*)
- Heartleaf philodendron (*Philodendron hederaceum*)
- Spider plant (*Chlorophytum comosum*)

Nicotine filter

- Devil's ivy (*Epipremnum aureum*)

Ammonia killers

- Broadleaf lady palm (*Raphis excelsa*)
- Creeping lilyturf (*Liriope spicata*)
- Flamingo flower (*Anthurium* genus)
- Florist's daisy (*Chrysanthemum morifolium*)
- Spathe flower (*Spathiphyllum wallisii*)

Off to greenhouse?!

Some might calculate that you need lots of plant pots to shoo away bad air. Is there sufficient room on the windowsill for this matter? Don't worry: Plant one plant that purifies the air in an AIRY planting system and it will be able to clean as much air as eight plants in conventional pots. In the following chapter, you will learn how AIRY was invented and how these intelligent plant pots work.

Tip: From human to plant

Certainly your plants recognize when you speak to them gently, since there are membranes in their cells that respond to sounds. And these evidently influence a plant's growth: The pores open up with certain soundwaves and the metabolism is stimulated. Here, the tone is decisive.

The experiment with wild plants found that they grow considerably better and their fruits turn out to be even more aromatic, when classical music is played to them. You can try it. Do your houseplants like Bach and Mozart as well? Be that as it may, continuous care will be definitely visible.

→ **Soft water**

Your finger is the quickest to discern, whether your plant is thirsty. If some soil sticks slightly to your finger, they do not need water. However, when the potting soil is very dry it cannot absorb water promptly: The water spills over, whereas the inside pot keeps dry. Therefore, it would be advisable to water the plants rather slowly and in portions. Plants prefer

stale and lukewarm water; rain water (soft and lime-deficient) would be ideal, as well as filtered water (e. g. osmosis plant).

→ **High-quality potting soil**

White limescale deposits show that the soil has become too alkaline due to chalky water. Repotting helps – or at least a little brush-up: Fresh potting soil can be worked in into the upper layer (5 cm). After repotting, the plant does not need fertilizer for at least six weeks, as fresh soil is rich in nutrients.

A few days before you fertilize your plant, you should water it. When your plant has already been in the dry for a while, it absorbs the nutrients too speedily and suffers from that afterwards. We highly recommend organic products which will be absorbed gradually unlike artificial fertilizers.

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The pot

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Back to the roots

You require a jungle in your room in order to achieve the desired effect of plant-based purification power, don't you?! One could possibly expect. This is actually not the case, if one considers the matter radically, from the roots so to speak. Just a quick reminder: Air-cleaning plants absorb plenty of harmful substances via their roots – much more than via their leaves. Fascinating things happen in the soil and in the plant pot, respectively; therefore we will have a closer look at what is going on there: Please turn the page!



Mini apartment or loft

Scientists in Jülich (North Rhine-Westphalia, Germany) compared 65 studies on plant growth in pots and found: Bigger pots let bigger plants sprout.

Images by means of magnetic resonance imaging showed how plants sense their physical barriers of their living space. But it is still unclear how it passes the information of the underground measuring on to its top. The plant, however, is clear about that and orientates its growth accordingly.

Rules in the ‘underground’

Roots have two development stages with one main function each: Fine roots that absorb water and nutrients by its root hair at its tip, and coarse roots that anchor the plant firmly to the ground. Unlike in limited pots, roots can grow freely in nature, adapt however to the conditions of the soil. There are in fact firm rules in the subsoil that protect against drought, nutrient deficiency, erosion, other plants and natural enemies:

1. Grow, until you cannot go further.
2. Should you butt against an obstacle, grow your way around it.
3. If you cannot go further on any account, stop growing upward and form new roots.
4. Grow away from your origin, never back.
5. Grow where it is humid and chilly.

Such a maze

Back to the plant pot: Its inhabitants behave as if thriving in nature. The roots butt against the impenetrable wall. By trying to avoid the obstacle they grow inevitably along the inside. The result: Endless circling roots develop – an effort that is absolutely ineffective and weakens the plant. Nutrients have to find all their way through the circling roots until they get upward, provided the tips of the roots find nutrients at all. The ball of roots snuggles along the inner surface of the plant pot, nutrients and microorganisms, however, bustle in the soil. So the plant requires a new home in order to avoid starvation.

Moving plans

Before you repot a plant with circling roots into a bigger pot, you should give it a signal in advance: Break some of the roots so that the root can form new roots at the breakage instead of growing in ineffective circles.

No matter how much you tend and cultivate your beloved plants, the knowledge remains: Millions of plants live in pots that make their lives miserable. How could one bring to a root's knowledge that it should not just circle along the inner surface of the pot but make use of the whole space available?

Air pruning

The answer to this question is part of ‘underground rule No. 3’: If you cannot go further on any account, stop growing upward and form new roots.

The tip of the root dies back in the wild when it comes upon an insurmountable obstacle; fine roots are formed in the back. The good news: There is a possibility to have the plants behave exactly the same in a pot: air contact. Air pruning prevents roots from growing in circles along the inner surface of the pot and makes it branch up again. This procedure is repetitive, so that a dense brachiated root system with root tips and fine roots evolves in the entire substrate.

Beautiful living

Roots need to be ventilated – that is not possible with closed pots. Fortunately, products can be reinvented. In this case, a plant pot that ventilates the root bales. That is, by the way, even beneficial for the microclimate of the soil, as useful bacteria and fungi prefer airy soil. Fine roots are stimulated to spread evenly in the soil, for them to make use of water and nutrients efficiently. And: They get access to pollutants that pollute our indoor air, as is generally known.

**AIRY is the first plant pot
to aerate the plants roots.**



Voilà: The plant-friendly AIRY pot

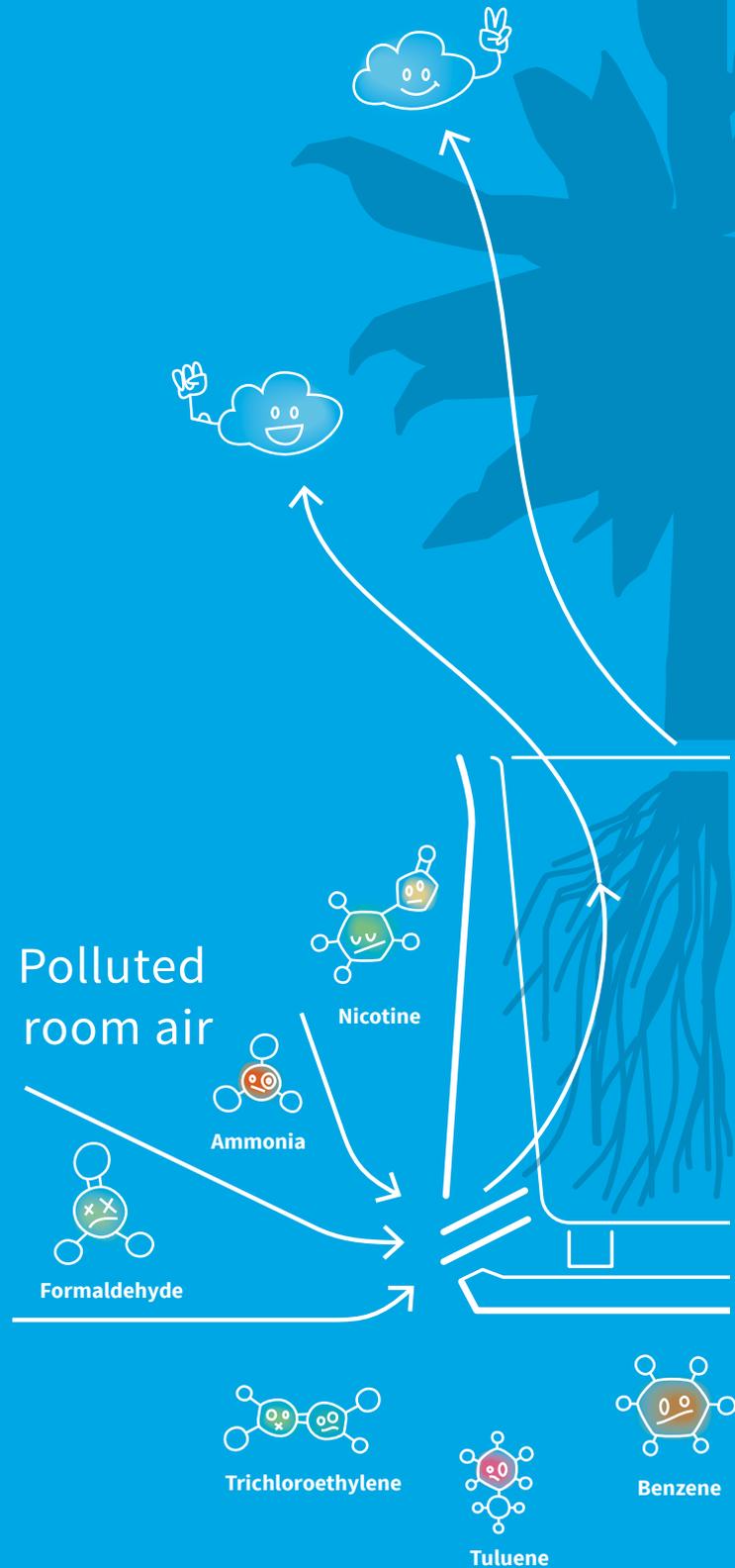
What does it have that other pots don't? In short: It takes care that your plants

- thrive particularly well,
- purify the indoor air optimally,
- are watered while you are away on travel.

And on top: It is good-looking. You do neither require technology nor electricity nor filters – just a plant, soil and our pot.

05 _ The pot

AIRY is the first and only plant pot to combine three competencies: Aeration of the roots including stack effect, soil irrigation and shapeliness.





Purified air



Benzene



Toluene



Trichloroethylene



Formaldehyde



Ammonia



Phthalate





Extra: Well-being for pot-dwellers

Rain makes beautiful. If they could, plants would love to go out and enjoy the mild wet. Thus, the plant would appreciate it if you put it into the garden during a soft and warm summer rain.

Such a beauty treatment cleans the leaves from dust and other dirt: This way, the sunlight will get into the chloroplasts more efficiently (those plant cells, that gives the plant its green color) and photosynthesis can work without restrictions. The plant gains more nutrients. And will thank you by flourishing and blossoming even more beautifully. Rain cleans even the stomata of the leaves, by which plants breathe: Now they

can take in more bad air again and release more oxygen and humidity. Usually, it is sufficient to let the plant be sprinkled two to three times a year. If you do not have a patio or balcony, or just want to grant your beloved plants a warm drizzle in cold times of the year, you can do so by giving it a gentle shower in the bathroom.



The inventor

Eventually, it is high time to introduce Helge Knickmeier, inventor of AIRY. The native of Hamburg had the idea to redesign the plant pot, as he had had enough.

Literally: Like lots of people, Helge suffered from hay fever; in addition, he was allergic to household detergents and solvents. The result was that he could not breathe freely, neither outdoors nor inside his own flat.



The turning point came with the millennium. Helge learnt about the NASA study of 1989 which proved the air-cleaning effect of plants for the first time. This was the point where the solution for his health issues sparked: There were natural air filters he could place just on his windowsill. Instead of copying them with elaborate technical efforts, he banked on the original. He pondered how to create perfect conditions for air-cleaning plants.

Product development

According to NASA, room air purification happens up to 90 % by the roots – but only when they get sufficient air. Helge got down to work. First, he single-handedly drilled holes into the plant pots. In 2003, the first pot to ventilate the root system came into being; the prototype was refined in the following years, certified by, for example, ‘TÜV Nord’ and the University of Beijing and was marketed under the name ‘polluSan’.

In 2015, Helge designed the optimized AIRY system with the assistance of the internationally renowned product designer Ämilios Grohmann. Before the end of the year, it will come onto the market.

Replies to questions from around the globe

In an AIRY pot, indoor plants become highly efficient pollutant filters, which purify the air by osmosis and active biomechanics. Many questions have reached us in the course of our successful Kickstarter campaign. Our AIRY team provides the answers:

What benefit will I gain from AIRY?

A plant, sound to the core and noticeably fresher and healthier room air.

Is it scientifically proven that the air is purified by this method?

AIRY is an internationally patented system for air purification that verifiably purifies the air of pollutants by means of indoor plants. One system (i. e. plant, soil, pot) can neutralize around 75 % of most dangerous environmental toxins – it takes just 24 hours in a room of the size of 16 m². Unlike closed pots, AIRY provides the roots with air. The air gets through the vents into the plant pot and ventilates the roots by the stack effect.

What exactly is the *stack effect*?

Through three lamellar vents at the bottom part of the pot, air rises between the inner pot and the outer shell upward and can escape again through gaps within the rim of the pot. The stack effect is, in this case, facilitated by the design of AIRY, by differences in pressure and temperature, as well as air movements in the room. As a result, roots can absorb environmental toxins significantly faster. Also watch our video about the stack effect at www.airy.de.

How does a plant know how to react when it suddenly finds itself placed in stale air?

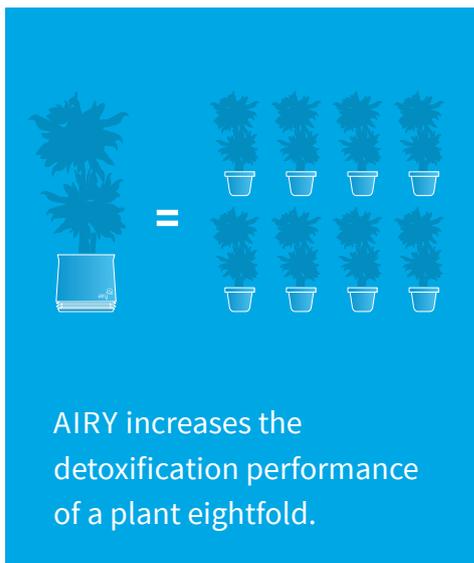
After being planted, it has to adapt to its new surroundings. Robust plants have developed water-bearing roots after about six weeks and partly lead

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them directly into the water reservoir. In this time, the plant learns its duties: The more contaminated the air, the more enzymes are produced by the plant, in order to be able to break down and transform toxic substances. Therefore, their performance enhances with the pollutant concentration.

How many plants do I need for one room?

It depends on the size: We calculate eight plants for roughly 20 m², that is for 50 m³ inside air – however, if a plant is potted in an AIRY pot, one is sufficient.



Why does AIRY have a water reservoir?

For two reasons:

1. The plant has access to water whenever it is needed and doesn't have to wait for being watered.
2. Conventional plant pots tend to waterlogging. But too much water displaces oxygen. As a result, not only water absorption and uptake of nutrients languish, but anaerobic decomposing processes arise as well that afflict the roots. This leads most often to the death of the plant. That is not going to happen in an AIRY pot since the root bale is protected from 'footbaths'.

Which soil consorts with AIRY?

All do. Our plant pot system can be filled with all substrates available on the market (like hydroponics, Seramis, Lechuza-Pon, or coco substrates free of humus). We recommend soil substrate, as it is a perfect source of life for plants and soil organisms and does not need much care on top.

How much care does a plant require? And do I need to have a green thumb?

The effort is quite small. When a

plant lives in an AIRY plant pot, its owner can make a journey for two to three weeks owing to the water tank. There is no need for a plant-sitter; the plants fetch their water by themselves. You do not need a green thumb – AIRY has one that takes care of optimal plant growth.

But repotting is necessary every now and then, isn't it?

No, unless your plant is still in a conventional pot you do not need to repot your plant. The ventilation in an AIRY pot regulates the root growth: As soon as the roots scent air they do not grow in length anymore but they branch out in the entire potting soil. This is to the benefit of the upper part of the plant, above the ground – it flourishes magnificently and its pot will not get too small or narrow. A plant can enjoy and feel good in an AIRY plant pot for years.

Houseplants would be great, but are they able to cope with warm air from the heating in the winter?

Certainly, when they are watered and sprayed as required. Plants do not only enhance indoor climate, they

also save us heating costs.

The rule of thumb is: Two AIRY systems increase the humidity of a 30 m² room to perfect 40 % to 60 %. Since we perceive more humid air to be warmer than dryer air, we can confidently turn the heating a bit down.

What kind of material is an AIRY plant pot made of? What sizes, designs and colors are available?

AIRY is round shaped and made of polypropylene plastic – indeed, the plant first nourishes itself by evaporations of the own plant pot. Planned are also oval variations, as well as designs made of wood and renewable raw materials. The model, which will be available from December 2015, presents itself in white with venting slots in 14 different colors. Its inner diameter is 22 cm – the plant pot is therefore even suitable for full-grown plants. You may place an order at www.airy.de/shop or with our order form on page 95.





**This is the founding team of
AIRY GreenTech GmbH:
Peer-Arne Böttcher, Kai Pohlmann
und Helge Knickmeier (f. l. t. r.)**

You can order clean air
with an AIRY plant pot!



Order

by mail

AIRY GreenTech GmbH
Elbchaussee 43
D-22765 Hamburg
GERMANY



Fax

+49 (0)40 570 184 02

INVOICE ADDRESS:	SHIPPING ADDRESS:
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QUANTITY	ARTICLE NR.	PRODUCT DESCRIPTION	UNIT PRICE	TOTAL PRICE

Any further query?
Feel free to contact us!
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Plants clean the air. NASA discovered:
This is happening via the plants roots.
AIRY is the first plant pot to aerate the
root system of indoor plants. The impact
is amazing.

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