

N O O K

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Maison 226, Melle
Photo - Barbara De Prest

Emptiness, simplicity and day light prevail in interior architect Barbara De Prest's design for the Maison 226 office building in Melle. One particularly striking stand-out feature is the imposing library bookcase which separates the reception area from the work area. Potted plants and trees, a ventilation system and an ionisation system combine to ensure a healthy indoor climate.

AIR

Properly tended plants purify the air

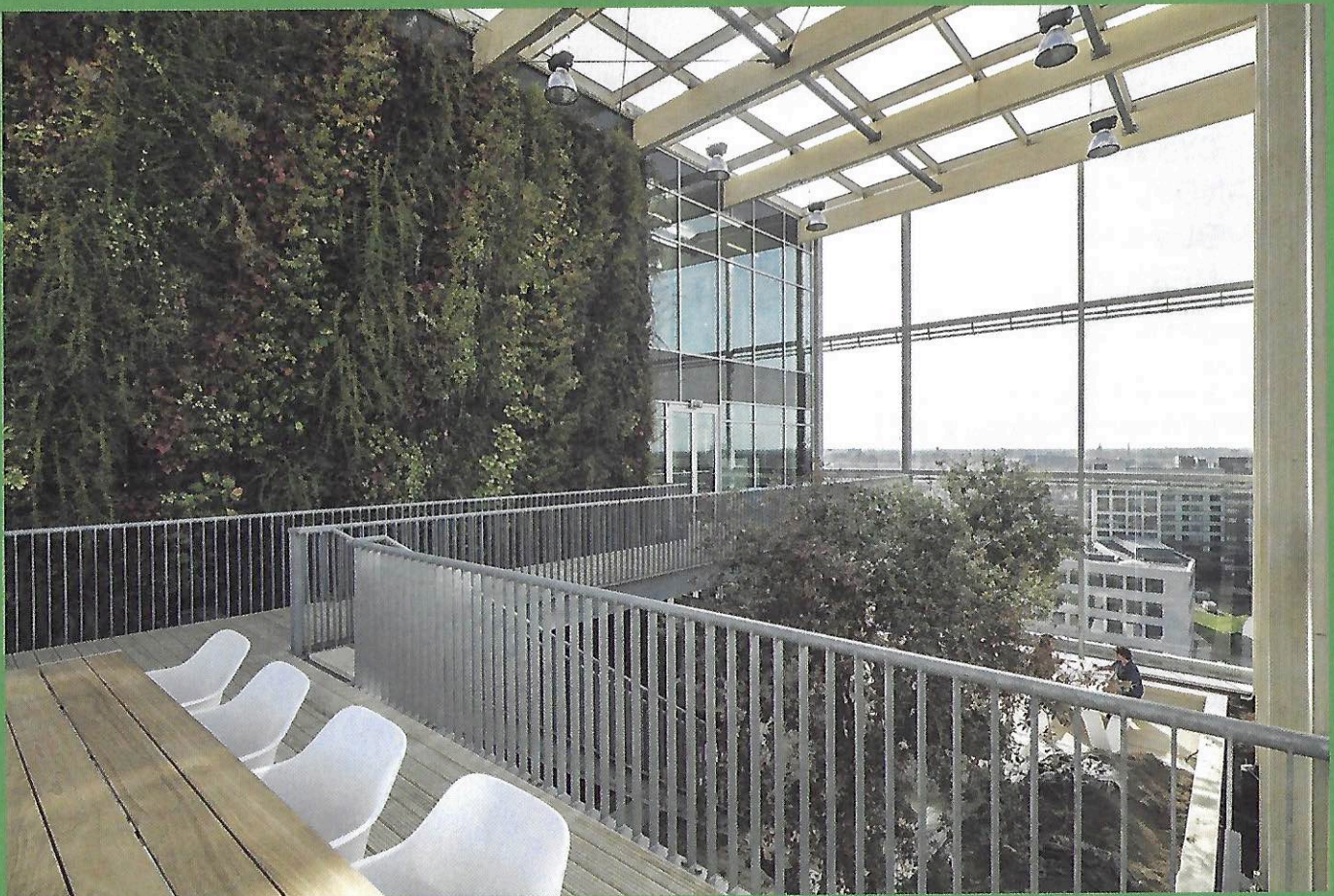


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Kraaijvanger Architects, town hall, Venlo, Image: Stijn Poelstra

Plants not only brighten up the interior, they also serve to purify the air. Plant scientist Pieter de Visser of Wageningen University & Research studied which plants are best suited to making the air healthier and how you can increase their performance. “A large peace lily can reduce unhealthy volatile organic compounds in the air by an additional ten per cent in quarter of an hour compared with a situation without a plant.”

Anyone visiting Venlo's town hall cannot ignore it. The external façade of the building consists largely of green plants. Inside the central lobby, too, you come across a wall of plants several metres high. It takes some getting used to. Few buildings contain such a massive amount of greenery. At the same time, the plants give off a fresh, healthy vibe.

Plant scientist Pieter de Visser of Wageningen Plant Research, a department of Wageningen University, predicts that more and more buildings and office spaces will be green in the future. Plants dress up a room nicely and create a green image. But that's not all. Recent research involving De Visser shows that plants in indoor spaces also help to purify the air in addition to the ventilation. They not only give the environment an attractive, green appearance, but are also good for the health of the people who live or work in the buildings.

How can you incorporate plants into your interior?

“In recent years, more and more new techniques and applications have been developed to integrate plants into interiors. Plant walls like the one in Venlo's town hall are one example. Plant columns are also a possibility. The advantage of these applications is that you can place many plants in a small area. Another option is gutters from which plants hang down. It's important that the plants get enough water and light to grow. That's where things sometimes go wrong. In many offices, plants are treated badly. The pellets are not moistened. They're a part of the furniture that we don't need to do anything about, some employees



Kraaijvanger Architects, town hall, Venlo, image: Ronald Tilleman

seem to think. I've been in an office where there were two enormous ficus plants that were dying. Obviously they're not able to purify the air"

How do you increase the air-purifying potential of plants?

"In the first place by taking good care of them and watering them regularly. Plants should not be more than two metres from a window. This isn't always possible in large office spaces. More and more companies are responding by supplying not only the plants, but also the corresponding lighting and water-circulation systems with pumps and fans."



Kraaijvanger Architects, town hall, Venlo, image: Stijn Poelstra

Which plants are best suited to purifying the air?

"Many plant species are capable of this, this has been known for some time. Our research shows that a large *Spathiphyllum* - also known as a peace lily - in a small office without ventilation can reduce the concentration of unhealthy substances in the air by an extra ten per cent in quarter of an hour compared with a situation without the plant. But actually the *Cyperus* - also known as the umbrella plant - is even more suitable, because this plant often stands in a layer of water and that substrate also plays a part. Research with the plants *clusia*, *ficus*, *anthurium* and *sanseveria* shows that they are also more or less capable of purifying the air."

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PLANT COLUMNS ARE A
GOOD SOLUTION

How do plants purify the air?

"Research has shown that two different processes are involved. Plants have tiny stomata that catch and

process the bad substances. The substances are, as it were, swallowed by the plant and dissolved. Another process involves the substances sticking to the plant and not being released. This is known as absorption. Initially, it was thought that the first process was the more important, but it's now clear that the second process has a much greater effect. The stomata process depends on light. The stomata only open when there's sufficient light in the room, which is by no means always the case, as described above."

What pollutants can plants purify?

"We focused on formaldehyde. This substance is found in building materials, such as chipboard and MDF. But it can also be found in textiles and in furniture and floor coverings. In large quantities, formaldehyde can be toxic. It can irritate the eyes, nose and throat and cause headaches or skin irritations. Formaldehyde is a substance that dissolves in water. That's why plants with moist leaves or roots purify more air than dry plants. Xylene is another substance that we have investigated. Cigarettes, exhaust gases and even furniture contain xylene. This substance can't be absorbed by the stomata, but sticks to the leaves. Plants with a large leaf area therefore purify more air and are healthier."

Can plants also process particulate matter?

"No, particulate matter is too large to be absorbed by stomata. Particulate matter can stick to the leaves and is then temporarily removed from the air, but it isn't

properly absorbed by the plant. If you brush against the plant or move it, the particulate matter is released into the air again. When people think of unhealthy air, they think of CO₂. But actually, CO₂ isn't very harmful at all in the concentration in which it is often found in indoor spaces. You have to do some really crazy things to get an unhealthy CO₂ concentration in a room. Plants can absorb CO₂ through their stomata, but this doesn't achieve much if the concentration is often not high enough to be harmful."

Why is it that many people go home after a day at the office with a headache and irritated eyes?

"This is due to a combination of a high concentration of formaldehyde, xylene and other volatile organic compounds (VOCs). And also to the poor air circulation in the room, which gives you very dry air. In recent years there has been a lot of investment in insulating buildings. But if everything is sealed tight and there's not enough ventilation, the air becomes very dry. Plants also play a role in humidifying the air through evaporation. Some plant wall suppliers even arrange for water to flow past the plants and place a fan on them, which increases the humidity and air quality in buildings, makes the plants grow better and provides more leaf area. Plants can also absorb noise. That's an additional benefit of investing in plants. Finally, don't forget the psychological effect. Studies have shown that the presence of plants has a relaxing effect on people."

How many plants do you need to benefit from their air-purifying function?

"Actually, you'd have to fill a quarter of the area with plants to have any effect. Obviously that's not practical in homes and certainly not in offices, because then you'd hardly be able to move. That's why plant walls and plant columns are such a good solution. But plants alone aren't enough. To create a healthy air climate, you also need a good ventilation system. Air purification by plants complements ventilation well."

Can the air-purifying function of plants also play a role in these coronavirus times?

"In the fight against COVID-19, it's very important that rooms are sufficiently ventilated. If you're going to ventilate a lot, the share of plants in purifying the air will decrease. By ventilating well, the unhealthy air can easily be replaced within an hour, but you can't increase the performance of plants. Good air conditioning is therefore much more effective in reducing the risk

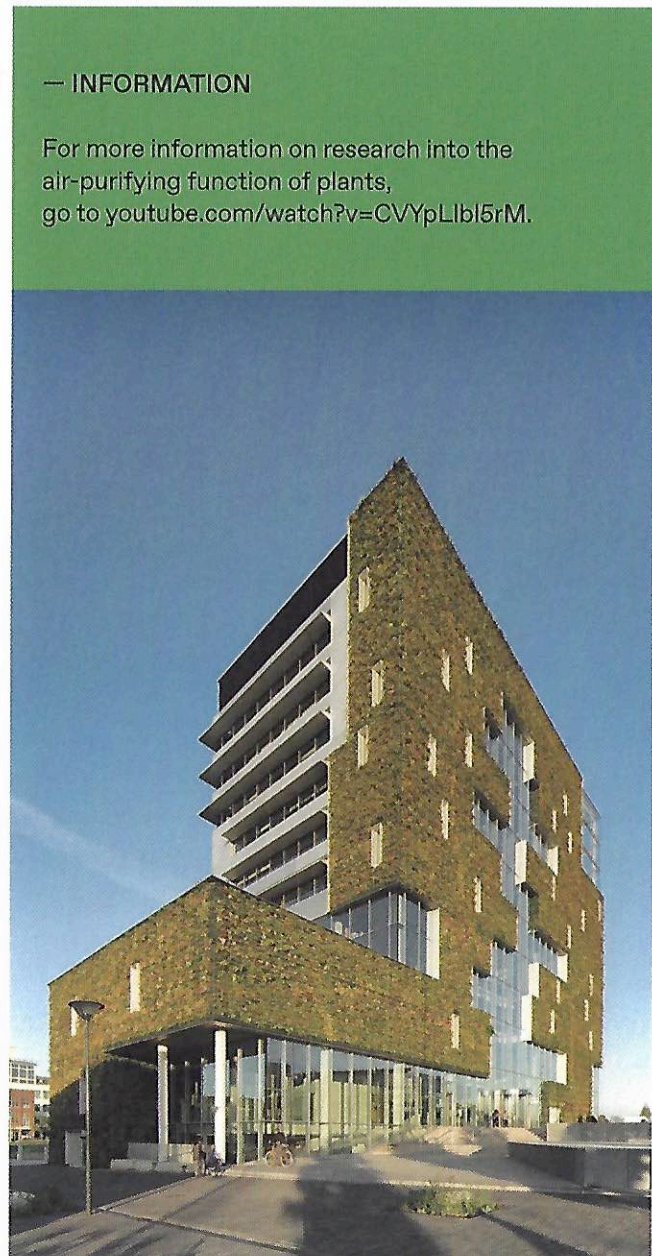
of COVID-19 than investing in more plants. The importance of the air-purifying function of plants increases in a well-insulated and poorly ventilated room."

Do you have a lot of plants in your workspace?

"Yes, in my workspace at the university there's a huge *Spathiphyllum* one-and-a-half metres in diameter. It provides very healthy and pleasant air. Another advantage is that I can hide behind it and take a nap."

— INFORMATION

For more information on research into the air-purifying function of plants, go to youtube.com/watch?v=CVYpLlBl5rM.



Kraaijvanger Architects, town hall, Venlo, image: Ronald Tilleman