PLANT LIFE BALANCE: THE SIMPLE SCIENCE

A new report puts science behind what many of us already suspect – that plants have the power to improve our health and wellbeing. This is your simple guide to the simple science.

THE SCIENCE IS OUT THERE

For half a century, scientists have been carrying out experiments to show the world that plants are good for our health and happiness.

That's a lot of experiments.

Today, as more of us live in smaller spaces, such as apartments, and spend more time indoors, we thought it was about time we brought the existing research together to figure out how having plants in our homes and workplaces could improve life in the 21st Century.

We worked with scientists at RMIT University, the University of Melbourne and CAUL Hub to take this world of research and make it easy to understand.

This report summarises what we did, and what we found.

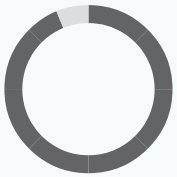
A BIT OF BACKGROUND

Humans have a deep-rooted connection to nature. But we're spending less and less time in it.

As well as being disconnected from nature, we're spending more time indoors. This increases our exposure to a range of airborne pollutants that are commonly found in our homes and workplaces, and that can be bad for our health.

The good news is that when we get out in nature, whether it's going for a run or going on vacation, we can quickly start to restore our health and mental wellbeing.

And – this is the good bit – research suggests that bringing nature indoors to where we spend most of our time can also have a positive impact on how we feel both physically and emotionally.

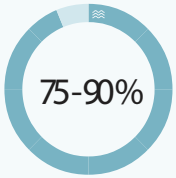


Need to get out more?

Current estimates indicate that urban dwellers spend 90% of their time in indoor environments[1].

Nature calls

A study found that people vacationing in the wilderness returned with a heightened ability to concentrate compared with people who did not take time off, or visited a city instead[2].



Natural air-fresheners

Studies show that indoor plants can remove 75-90% of airborne pollutants depending on the plant and type of pollutant[3].

[1]USEPA 2007
[2]Hartig et al. 1991 in Kaplan 1995
[3]Tiwary et al. 2009; Beckett et al. 2000; Ottelé et al. 2010, Fujii et al. 2005; Park et al. 2010; Makido et al. 2012, Fujii et al. 2005, Wolverton et al. 1989, 1993; Wood et al. 2006; Tarran et al. 2007; Wetzel & Doucette 2015

WHAT WE DID

Although many of us know that sharing our homes with plants makes us feel good, it's hard to put actual figures on the benefits that indoor plants bring to our lives.

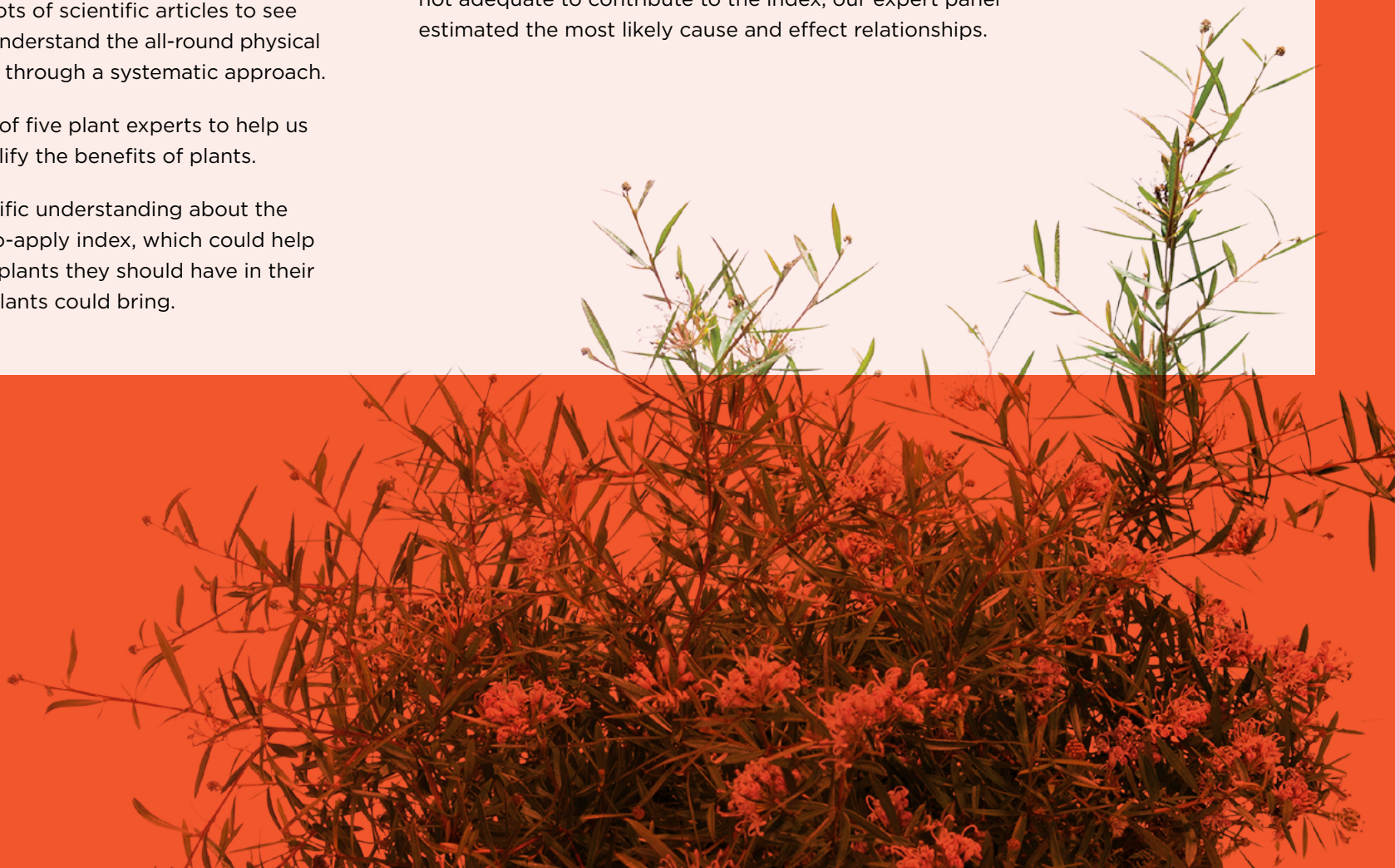
Our approach was to review lots of scientific articles to see the bigger picture – to try to understand the all-round physical and mental benefits of plants, through a systematic approach.

We brought together a panel of five plant experts to help us review the literature and simplify the benefits of plants.

We then used all of our scientific understanding about the benefits to develop an easy-to-apply index, which could help people see how many indoor plants they should have in their homes, and the benefits the plants could bring.

BASEline approach

As much as possible we used Best Available Scientific Evidence – BASEline – to determine the relationships between plants and health and wellbeing. Where our information was not adequate to contribute to the index, our expert panel estimated the most likely cause and effect relationships.



WE TOOK 101 ARTICLES

Our research team gathered together 101 scientific articles that explored the benefits of plants in indoor environments. They grouped the articles according to two benefits: air quality and wellbeing.

Air quality

Each of the articles in this group looked at a plant's ability to absorb airborne pollutants, such as particulate matter, inorganic compounds such as carbon monoxide, and volatile organic compounds – VOCs.

Wellbeing

Articles in this group investigated any direct benefit, such as improved mood and concentration, or indirect benefit, such as productivity and positive social behaviour, that indoor plants might have caused.

Why does particulate matter, matter?

Particulate matter is a widespread air pollutant, consisting of a mixture of solid and liquid particles suspended in the air. It includes things like dust, pollen, soot and smoke.

What are VOCs?

Organic chemicals are widely used in household products, including paints, furniture finishes and many cleaning products. Being volatile means they can easily become vapours or gasses, which contaminate our air.

The most common VOC that humans come in contact with is benzene, which been associated with a range of acute and long-term adverse health effects and diseases.

Did you know?

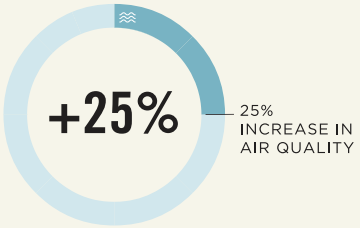
Concentrations of many VOCs are up to 10 times higher indoors than they are outdoors.

THE PLANT LIFE BALANCE INDEX

Based on all the articles they'd examined, using best available scientific evidence and a number of assumptions, our research team and panel of experts came up with a rule of thumb to help people improve their plant life balance.

THE SIMPLE RULE IS THAT, IN A MEDIUM INDOOR SPACE:

1 MEDIUM SIZED PLANT =



AND WHEN IT COMES TO WELLBEING:

5 OR MORE PLANTS IN A MEDIUM INDOOR SPACE, OF ALL DIFFERENT SPECIES AND SIZES =

LEADS TO SIGNIFICANTLY IMPROVED WELLBEING

WE FOUND TWO BIG BENEFITS

Based on the research, our expert panel recommended that the benefits of indoor plants could be grouped into two categories: increased air quality and enhanced wellbeing.

Air quality

We found that indoor plants improve air quality by filtering out particulate matter, or air pollution, and other airborne toxins caused by organic chemicals in things like paints and furniture finishes.

Wellbeing

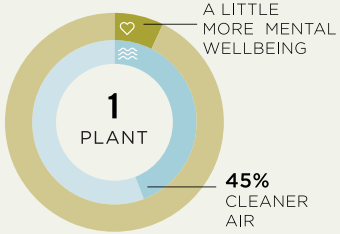
Wellbeing refers to feelings of relaxation, inspiration and positivity. Our research found that indoor plants can benefit wellbeing, depending on the total number of plants, combined with the variety of the plants. For example, a big group of plants that looks complex, or has lots of different varieties of plants, is able to fascinate, foster relaxation and help people de-stress.

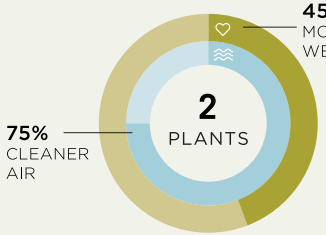
We also found that while variety was key, it was also important to create a cohesive ‘look’ – or organised complexity within a group of plants – to optimise wellbeing.

THE RATING SYSTEM

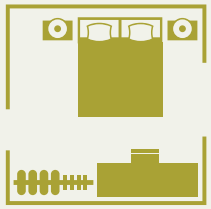
The rating system makes it easy to understand the health and wellbeing benefits at a glance for different sized rooms. These are all based on medium sized plants (around 0.6m to 1.2m tall).

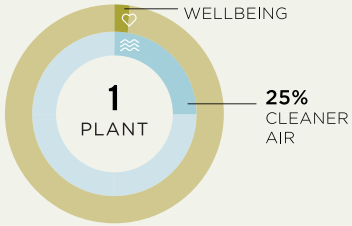
SMALL ROOM
(3x3)

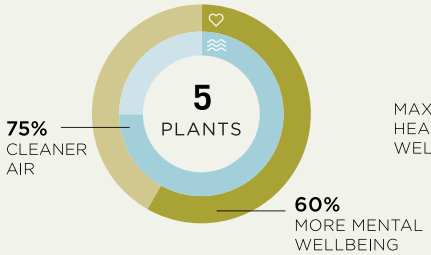


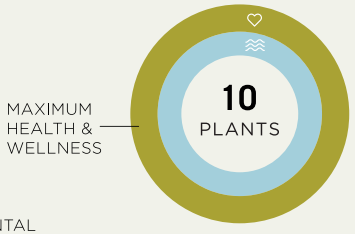


MEDIUM ROOM
(4x5)

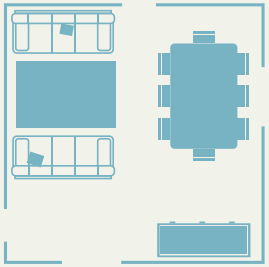


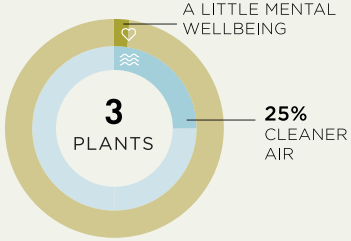


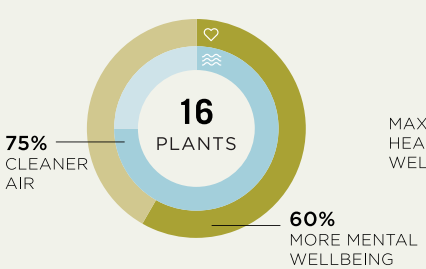


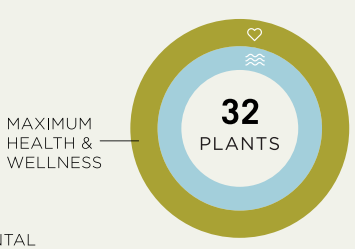


LARGE ROOM
(8x8)









SIZE MATTERS

Plants come in all shapes and sizes, and vary in their ability to absorb and eliminate pollutants.

We took this into account and developed a plant multiplier, to help work out how many small or large plants would be needed to do the same job as a medium plant.

We assumed that leaf surface area would affect a plant's ability to filter our pollutants and worked out the number of small, medium and large plants needed to fill 1m2 of leaf area.

As shown in Figure 1, a small plant has a value of 0.3, a medium sized plant has a value of 1, a large plant has a value of 1.5.

COMMERCIAL SIZE		PLANTATION DENSITY RANGE	MULTIPLER VALUE
	**Small Plant**	Requiring more than six plants per m^2	0.3
	**Medium Plant**	Requiring one to five plants per m^2	1
	**Large Plant**	Requiring less than one plant per m^2	1.5

Species matters

The science above works on an averaging method. It's designed to be simple, to give you a well-estimated rules of thumb for improving your health and wellbeing.

When it gets to the details, some plants are better at improving air quality than others. NASA's Clean Air Study provides a good list of common indoor plants and the toxins they remove:

https://en.wikipedia.org/wiki/NASA_Clean_Air_Study

THE PLANT LIFE BALANCE APP

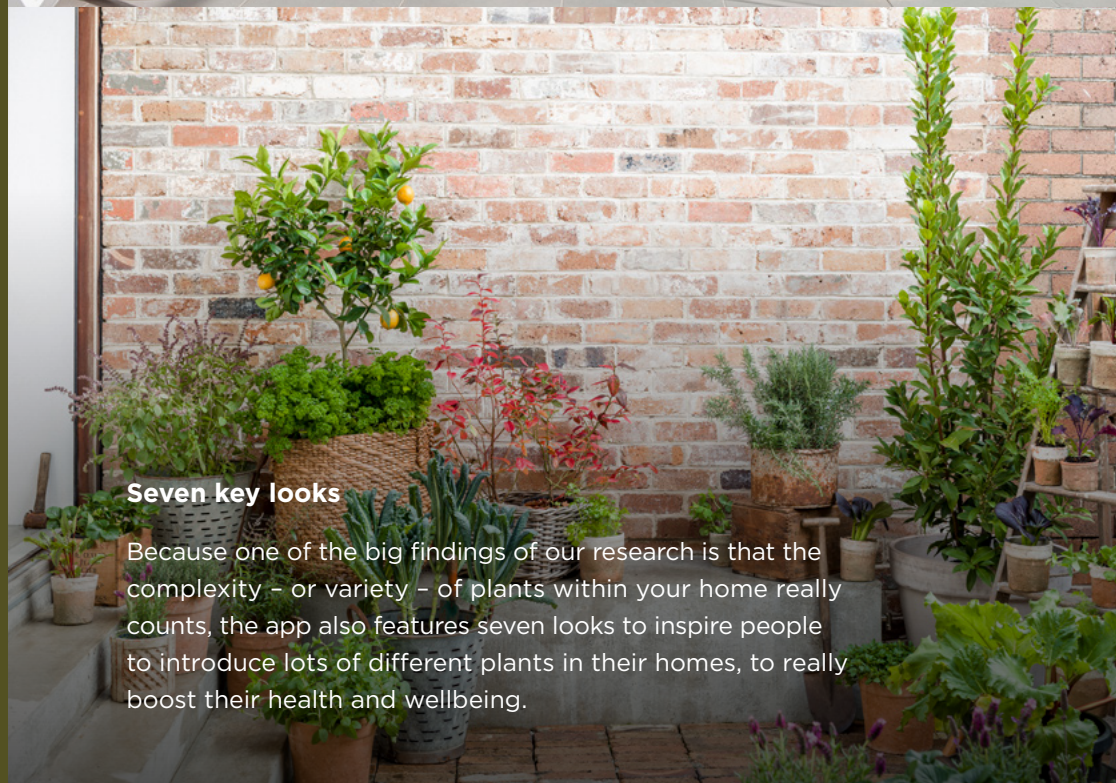
We used the Plant Life Balance index to develop a smartphone app.

The Plant Life Balance app is for people to optimise the use of plants within their homes, to boost their physical and mental wellbeing. The app allows people to assess their current plant life balance – based on size of rooms and number of plants within – and then choose more plants to enhance their benefits.

By interactively asking people to rate and improve their spaces, the app encourages them to understand the benefits that plants bring.

Available on the iPhone App Store | GET IT ON Google Play

Want to know more?
Get the full science report here: plantlifebalance.com.au



Seven key looks

Because one of the big findings of our research is that the complexity – or variety – of plants within your home really counts, the app also features seven looks to inspire people to introduce lots of different plants in their homes, to really boost their health and wellbeing.