



# PLANTS AT WORK

**IMPROVE YOUR BOTTOM-LINE**  
PROFIT-PEOPLE-PLANET!

## Research shows that indoor plants

- > Improve productivity and performance
- > Reduce indoor air pollution
- > Reduce sick-leave
- > Lower stress and negative feelings
- > Improve business image with potential clients
- > Contribute to fulfilling at least 75% of Indoor Environmental Quality (IEQ) Criteria

## INDOOR PLANTS REDUCE ALL TYPES OF URBAN AIR POLLUTION

And, indoor air is almost always more polluted than outdoors. In particular, indoor air generally has more:


- > **Volatile organic compounds (VOCs)**  
Emitting from plastics/synthetics, in furniture, fittings, computers, printers and more, cause loss of concentration, headaches, eye, nose and throat problems.
- > **CO<sub>2</sub> (us breathing)**  
Causes drowsiness, 'heavy-head', lowered concentration

**Overseas findings<sup>1-4</sup> indoor plants can reduce:**

- > **Nitrogen and sulfur oxides**
- > **Air toxics**  
(ie, volatile organic compounds, VOCs) eg BTEX (Benzene, Toluene, Ethylbenzene, Xylene); & PAHs
- > **Particulates**  
(eg PM10/2.5)
- > **Ozone**

**Our UTS findings<sup>5-9</sup> indoor plants can reduce:**

- > **VOCs**  
By over 80% to below 100 ppb (Aust. Office Max. 500 ppb)
- > If VOC loads go up, so do removal rates
- > All plant species equally effective (the process depends on symbiosis with normal potting-mix bacteria)
- > Works day and night (24/7)
- > And 20 cm pots are as effective as 30 cm pots (ie abundant capacity for VOC removal)
- > **CO<sub>2</sub>**  
> By 10-25%
- > Exchanged for equal amount of O<sub>2</sub> two-way refreshment!
- > The more foliage the better
- > Optimise CO<sub>2</sub> reduction by placing plants according to their recommended shade tolerances
- > **CO (carbon monoxide)**  
> By up to 90%



Indoor plants can be deployed to reduce building A/C energy costs, for sustainable urban living.

## PLANTS AT WORK DIRECTLY INCREASE PRODUCTIVITY AND PERFORMANCE

International research shows indoor plants provide multiple benefits to building occupants:

**Reduced illness symptoms<sup>10-14</sup>:**

- > Sick leave in office staff
- > Sick-leave in school children
- > Coughing, wheezing
- > Sore eyes, nose, throat
- > Pain perception
- > Lower blood pressure
- > Reduce 'attention fatigue'
- > Intentions to quit (save on training new staff)

**Improved performance scores on<sup>15-17</sup>:**

- > Sorting tasks
- > Creative thinking tests
- > Examinations
- > Computer task productivity 12%
- > Attentiveness - 27%

And a productivity improvement of less than just 1% more than repays the cost of the indoor plants.

## INDOOR PLANTS GREATLY REDUCE STAFF STRESS – PROMOTING PRODUCTIVITY & PERFORMANCE

**Medical research shows**

- > Stress reduces productivity and performance, and leads to illness;
- > Stress-related illness is a widespread urban health concern<sup>18,19</sup>.

**Our UTS study shows large stress reductions with indoor plants<sup>6</sup>**

- > First such study to use standard international psychological surveys
- > 40 respondents

**Results**

**Staff with one or more plants in their offices showed reductions in\*:**

- |                      |      |
|----------------------|------|
| > Anxiety            | -37% |
| > Anger              | -44% |
| > Depression         | -58% |
| > Fatigue            | -38% |
| > Confusion          | -30% |
| > Overall negativity | -65% |
| > Overall stress     | -50% |

\*No-Plant (Control) group showed the opposite trend -

- > Increased negativity +20-40%

Indoor plants directly raise spirits- Increasing productivity and performance.

## INDOOR PLANTS IMPROVE BUSINESS IMAGE WITH POTENTIAL CLIENTS/CUSTOMERS

Surveys show<sup>19,20</sup> – Plants in the foyer and office spaces give the perception that the company is:

- > Trustworthy
- > Warm and welcoming
- > Stable and balanced
- > Well-run
- > Patient and caring
- > Concerned for staff welfare
- > Comfortable to work with
- > Prepared to spend money on added beauty
- > Not mean
- > Providing a healthier, cleaner atmosphere

Cleaner air is healthier air, and leads to clearer thinking!

## PLANTS ALSO IMPROVE STAFF JOB SATISFACTION

Surveys show<sup>12,21</sup>

- > Improved scores on full range of job satisfaction criteria
- > Plants on or near desk preferred to leafy window views, Why?
- > They give more immediate, living, green aesthetics 'biophilia'!

## And CONTRIBUTE TO AT LEAST 75% OF INDOOR ENVIRONMENTAL QUALITY (IEQ) CRITERIA

IEQ criterion	Indoor plants
Air pollution mitigation*	Reduce all types of UAP**
Low Emitting Materials*	Absorb toxic emissions - VOCs etc.**
Ventilation effectiveness*	Increase effectiveness - remove CO <sub>2</sub> /add O <sub>2</sub> **
Lighting*	OK for Plants? - OK for staff also?*
Noise*	Absorb & buffer noise*
Views*	Add aesthetics & calming greenery; lower stress**
Thermal comfort*	Not directly influenced – but tend to stabilise humidity in human comfort zone, so could have unquantified effects here*
Systems controllability*	Not directly influenced – but stabilisation of temperature and humidity could lower air-con. energy consumption

\*Criteria list - NSW Government - Workplace Guidelines, 2010.  
+Overseas studies; \*\* O/S & UTS studies

### Greening the great indoors for productivity and performance

- > Think desk-tops; file-top 'hedges'; green zones; nooks; spaces; walls, or vertical gardens.
- > There's a 'living green' contributor to productivity & workplace sustainability in every building situation.

Plants at work improve your triple-bottom line.





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