



ALMA MATER STUDIORUM
UNIVERSITÀ DI BOLOGNA



'Green' ornamentals for indoor farming

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Forcing



Mediterranean shrubs for green roofs



LED supplemental lighting



Indoor living walls

Urban - Indoor farming within buildings

usually for vegetable and at most for **herbs growing**

Advantages:

Zero-miles edible plants

Sustainable (high use-efficiency of production factors e.g. soil, water)

Overall, bringing plants into the city and the house, makes man aware of the plant growing process and **closer to nature**



Indoor miniature greenhouse for windowsill
Small scale

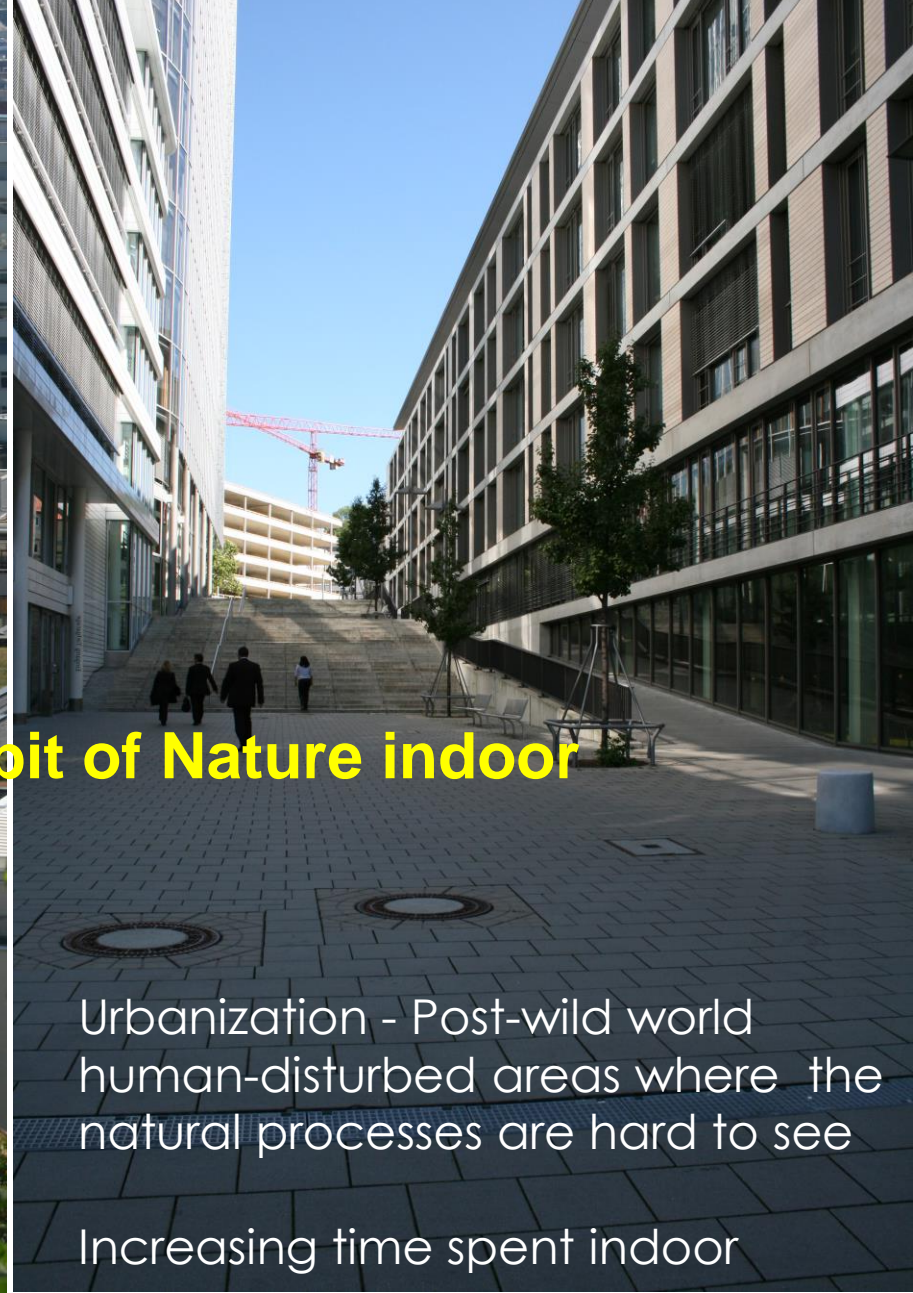


Open-view farm

Vertical farm
Industrial scale



Need to bring a bit of Nature indoor



Urbanization - Post-wild world
human-disturbed areas where the
natural processes are hard to see

Increasing time spent indoor

Plants have a proved beneficial influence on man and are the most 'natural' solution for improving mental and physical human well-being

Better psycho-physical conditions by:

- reducing the temperature
- increasing RU (Lohr, 1992)
- reducing high frequency noises (Costa and James, 1999)
- Improving the air quality /removing 20% dust (Lohr and Pearson-Mims, 1996) and pollutants
- reducing sick building syndrome

More than 60 **ornamental species** resulted able to metabolize CO_2 , NO_2 and NH_3 (Coward et al., 1996; Yoneyama et al. 2002), SO_2 (Lee and Sim, 1999), VOCs (e.g. xylene, formaldehyde, toluene) in symbiosis with gram positive bacteria of rhizosphere (Wolverton et al., 1989; 1991; 1993)

Nephrolepis exaltata, *Hedera helix*, *Phoenix roebelenii*



- Plants add an 'alive' focal point to **work environment**; significantly reduce workplace stress and enhance productivity; 15% reduction in absences from work
- Longer concentration time of students; didactic purposes **(schools)**
- Faster healing **(hospitals)**
- Marketing image of environmental – friendly **(stores, hotels)**



Replay - Milano



Project of Mikyoung Kim and Wirtz
Landscape design Studio, 2012

Crown Sky Garden at Chicago Lurie Children's Hospital

Play area for sick children, parents and
hospital staff.



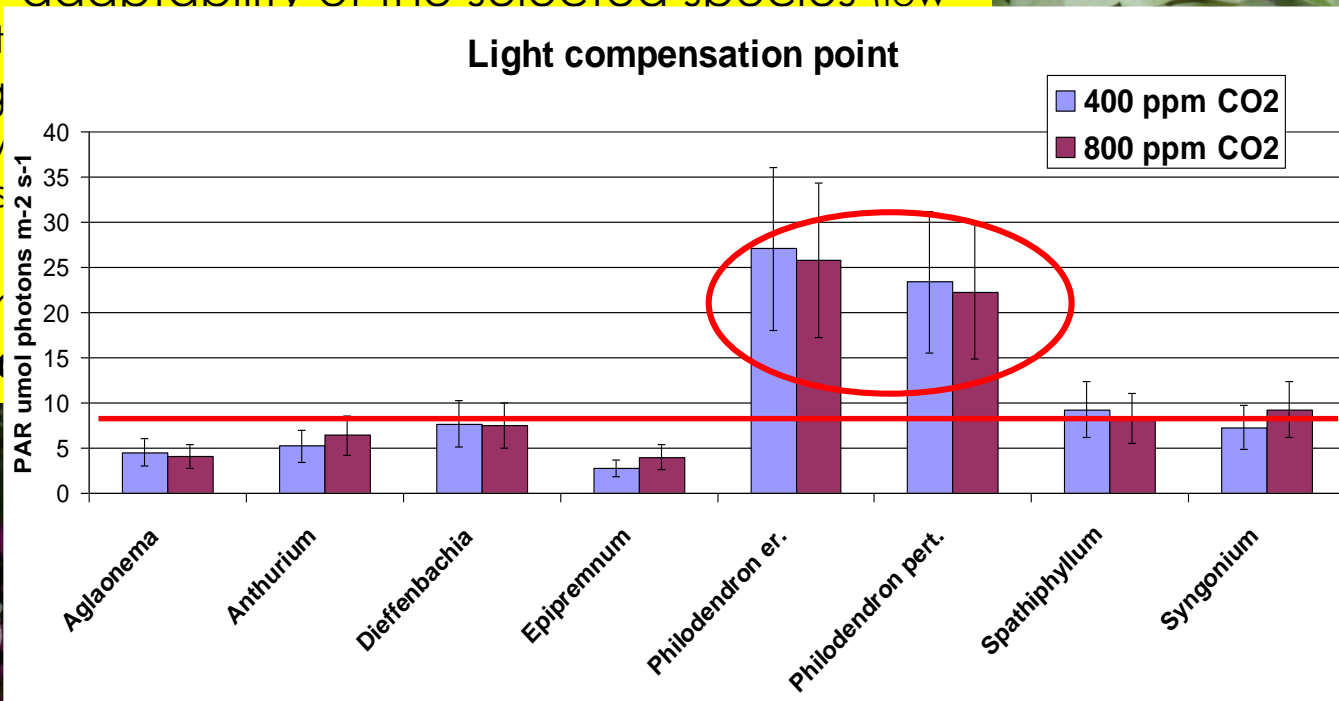
- Plants personalize a space, making the **house** a welcoming place to return to, relax and recharge
- **'Feeling green'**



Different styles and atmospheres – Royal Flora Holland Fair - November 2019

Indoor ornamental plants, not-for-food plants,
are particularly suitable for:

- high adaptability of the selected species (low light intensity)
- Long life span
- Many different habitus
- easy maintenance
- Strongly ornamental



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Uses:

Green interiorscapes, **part of the building's architecture**, within building (Landscape Dept. Wageningen)



Green living walls – Poliflor Unicredit MI



Living walls
Flowering and green leaved plants

Uses: Pots



Including cut
flowers



Hanging containers

Up to date market trend:

- Small size pots
- New species



URBANFARM2020



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100% recycled and recyclable



Biodegradable pots and sustainable production
Main subject of the RFHF 2019



Second life of materials



Eco biosphere in a glass





Small indoor spaces, low price,
easy maintenance
Living walls, terrarium, etc.

Small pot plant production is a must



micropropagation



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Small flowering and green plants from micropropagation could be suitable for **industrial urban farm**



Open-view farm
*Vertical farm
Industrial scale*

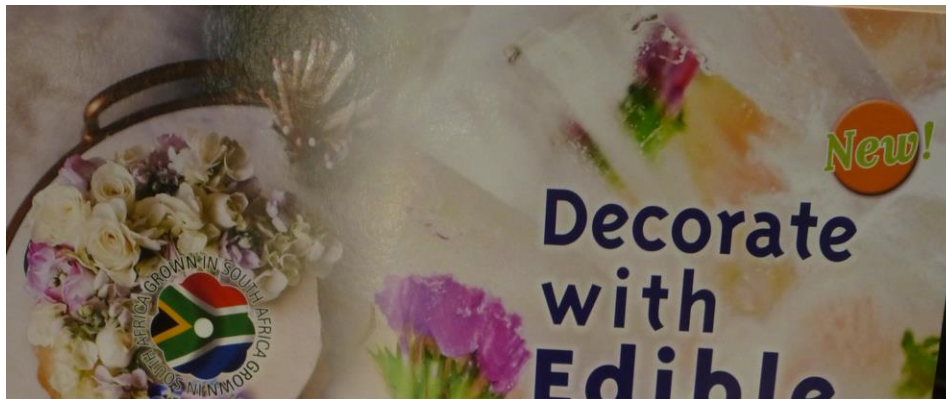


The same systems used for vegetales
Soilless culture and artificial lighting

Including **edible flower plants** **all year round**

e.g. violet, *Tropeolum majus*, *Calendula officinalis*, *dianthus*, *pelargonium*

New researches are starting!



Including **aeroponic systems for epiphyte plants** as in traditional greenhouses



Tillandsia usneoides - Bromeliaceae



Vanda - Orchidaceae



“We expected that indoor plants will become standard technology - a vital building installation element, for improving indoor environment to man (V. I. Lohr) and could be a profitable 0-mile production for urban farms respectful of sustainable growing protocols (M.E. Giorgioni)

'Green' ornamentals for the market of 2020





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