The **Performance** and Added **Value** of **Culture-based Green** Wall

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Today's menu

- **Intro**duction
- **Environment**al performance
- **Added (?) value**
- **Challenges**
- Meet the **team**
- Contextual: **local** and **cultural**
- **Experiment**al setting
- The **next** steps

Widya Chandra Residence, Jakarta, Indonesia
Source: Tropica Greeneries

Introduction

- History:
  - Ancients: Hanging garden of Babylonia
  - Medieval: medicinal herbs and food crops in Europe
  - Modern: Patrick Blanc, the rise of hydroponic
  - Architectural integration
  - Technological advancement: irrigation systems, lightweight materials, plant selection
  - Global adoption

Quai Branly Museum by Patrick Blanc
Source: Tropica Greeneries

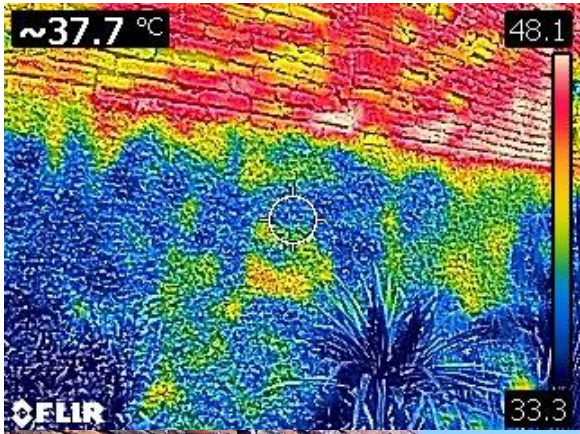
- Terminology :
  - Green wall
  - Living wall
  - Vertical garden
  - Vertical farming
  - Urban farming
- Types of green wall
  - Modular panel systems: pre-vegetated panels and modular tray system
  - Hydroponic
  - Living wall systems
  - Bio-integrated systems
  - Indoor or Outdoor
  - Design: artistic and customized
- Media
  - Media-free
  - Freestanding media
  - Mat media
  - Sheet media
  - Structural media

Mayapada Hospital, South Jakarta, Indonesia

Source: Tropica Greeneries

Environmental performance

- Building condition: thermal
- Water reuse and management
- Phytoremediation
- Improved health and well-being
- Acoustic performance
- Biodiversity enhancement
- Microclimate improvement



Preliminary study, Nanik's House, Yogyakarta, Indonesia

Added (?) value

- User preference
- Aesthetics
- Relaxation
- Economic
- Food production
- Medicinal
- Increasing property value

Beach cabin, Yamaguchi Japan

Challenges

- Maintenance
- Cost
- Structural considerations
- Water usage
- Limited plant selection
- Installation challenges
- Potential damage
- Aesthetics issues
- Long-term viability
- Pest
- Keys: proper planning, design, and maintenance

Meet the **team**

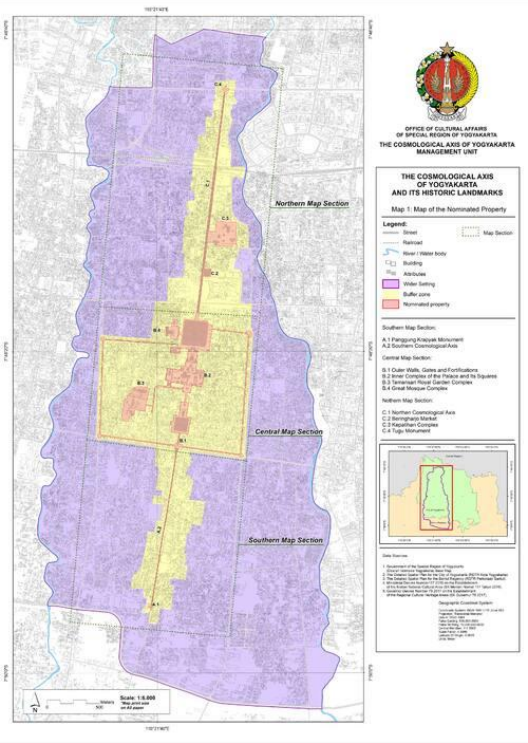
- **Alex**ander Suryandono (Architecture/UGM)
- **Weimin Wang** (Mechanical Engineering/UNC Charlotte)
- **Wisnu** Hardiansyah (Architecture/UGM)
- **Cantya** Marhendra (Planning/UGM)
- **Pinjung** Nawang Sari (Agriculture/UGM)
- Anggia **Murni** (PT Tropica Greeneries)






Contextual: **local** and **cultural**

- **Yogyakarta**, Indonesia
- **Preservation** of cultural heritage
- **Community** engagement
- **Tourism**



Yogyakarta, Indonesia (top)
Source: maps.google.com
The Cosmological Axis of Yogyakarta and Its historic Landmarks (bottom)
Source: unesco.org

- **Economic** development
- **Environmental** benefits
- **Educational** opportunities
- **Climate** resilience

Experimental setting

- Wall orientation : east
- Location : 1st floor east wing Department of Architecture and Planning UGM
- Sunlight exposure from around 8:00 – 11:30 am
- Segment : division by 60/60 structural columns, structural grid 7200 mm

3d model of proposed vertical greeneries

- Plant types: 3 herbs + 3 climbers. Herb X should be a plant which emits more humidity
- All plants should :
  - be locally grown and available
  - have traditional medicine as added value
  - low maintenance

Available seeds in common agriculture product store






Chosen plants:

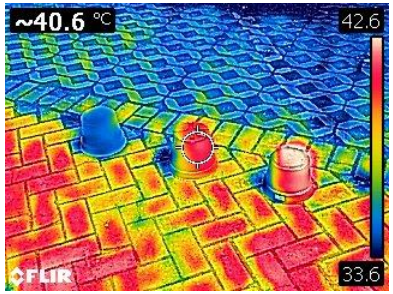
Rosemary/ Salvia rosmarinus. Source: ilmubudidaya.com
Mint/ Mentha spicata. Source: kompas.com
Kemangi/ Ocimum africanum. Source: hellosehat.com
Cabe Jawa/ Piper retrofractum
Cincau hijau/ Cyclea barbata. Source: berita99.co
Bunga telang/ Clitoria ternatea

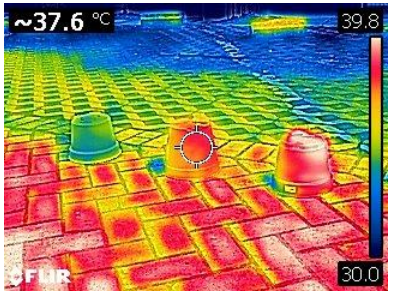
- Planting container:
  - plastic pot, pottery pot,
  - hdpe wallplanter bag, geotextile bag

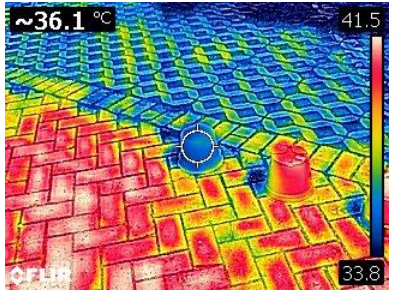
Geotextile wallplanter

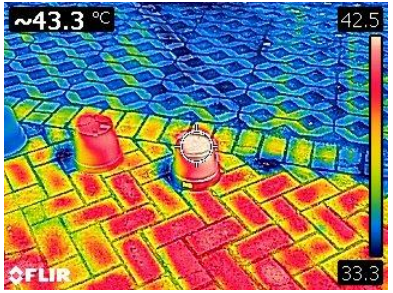
Source: Tropica Greeneries

HDPE wallplanter



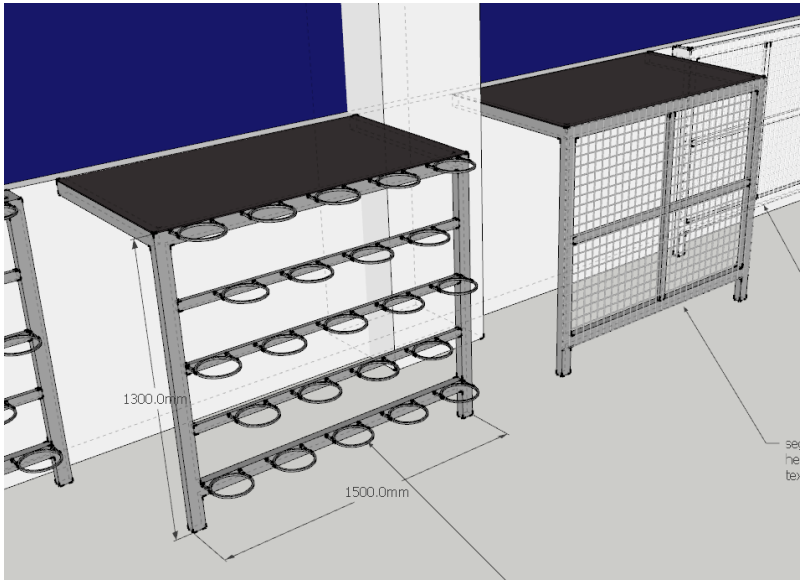






Preliminary study:
pot temperature

- Planting platform:
  - type A : 1500 mm (w) and 1150 mm wire mesh + 150 mm stand = 1300 mm (h). 40 mm x 40 mm galvanized hollow steel main frame. Circular rebar diameter 10 mm with planting hole diameter of 180 mm
  - type B : 1500 mm (w) and 1150 mm wire mesh + 150 mm stand = 1300 mm (h). 40 mm x 40 mm galvanized hollow steel main frame. Wire mesh diameter 4 mm with rectangular arrangement at 50 mm x 50 mm

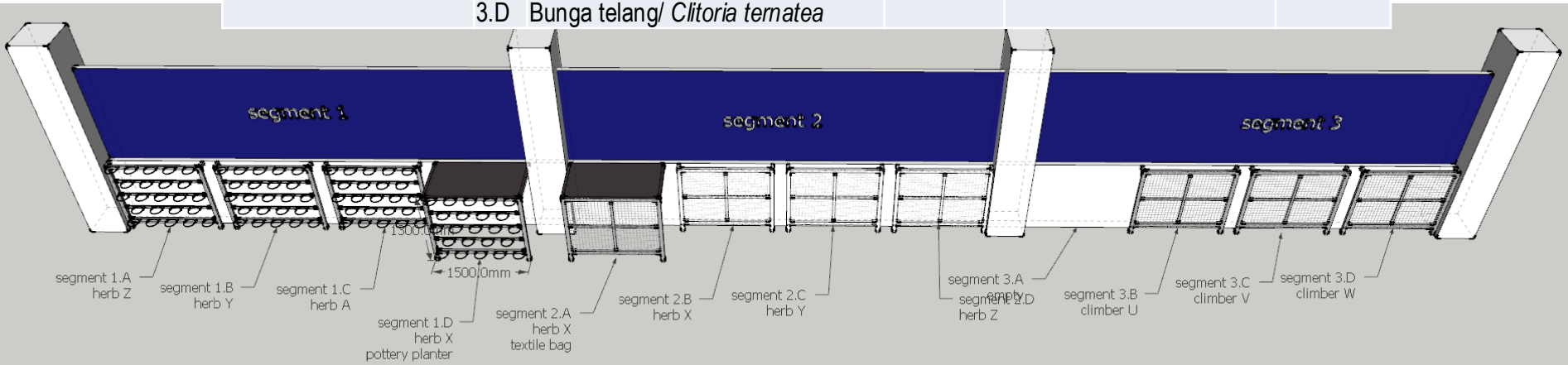


Detail of 3d model: type A (left) and type B (right)

- All planting platform are placed 100 mm outside the wall and backed with 40 mm polycarbonate for humidity barrier except segment 1.D and 2.A. Planting platform at these segment are without polycarbonate back and placed 800 mm gap from outside wall with galvalum roof on top of the gap. The planting platform is adjustable, meaning that it can be moved closer to the wall.
- Data logger will be placed on the gap to measure the humidity and temperature. Wind data logger will also be placed at the middle of the gap

Planting platform type B with plastic planter on the bottom

HERBS + CLIMBERS					
segment 1	1.A	Rosemary/ *Salvia rosmarinus*	type A	plastic + pottery pot (?)	100 mm
	1.B	Mint/ *Mentha spicata*			
	1.C	Kemangi/ *Ocimim africanum*			
	1.D	Kemangi/ *Ocimim africanum*		pottery pot (?)	Adjustable (max 800 mm)
segment 2	2.A	Kemangi/ *Ocimim africanum*	type B	textile bag	
	2.B	Kemangi/ *Ocimim africanum*		textile + hdpe bag	100 mm
	2.C	Mint/ *Mentha spicata*			
	2.D	Rosemary/ *Salvia rosmarinus*			
segment 3	3.A	empty/bare wall/benchmark			
	3.B	Cabe Jawa/ *Piper retrofractum*	type B	rectangular plastic pot	100 mm
	3.C	Cincau hijau/ *Cyclea barbata*			
	3.D	Bunga telang/ *Clitoria ternatea*			



Detailed 3d model of proposed vertical greeneries for the 1st floor

The next steps

- Further research
  - Agriculture
  - Structural
  - Integration with building systems
  - Circular economy
  - Sustainability and Life-cycle assessment
  - Community engagement and social acceptance

Feedback and **Discuss**ion
Thank you

Let’s turn over a leaf

References

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