

Can You Imagine The World Without Green?

Beliefs of



人と自然と響きあう

Green Visibility Percentage

Looking at greenery is good for your eyes because studies have shown that the **color green** is very soothing to the eyes.



Green Amenity



Plants can be used to increase the overall health and quality of life in your living space





A GREEN TECHNOLOGY BY TOYOTA SUNTORY MIDORIE

Pafcal Story



ズームアップ！環境ビジネス

サントリーで始まった『環境緑化事業』

国内大手の飲料・ビール・酒類メーカーとして知られるサントリー株式会社（本社・大阪市）は、05年から環境緑化事業をスタートさせました。同社は1899年の創業以来、「やってみなはれ」のチャレンジ精神で、酒類、食品事業にとどまらず、健康食品、外食、花などの事業を展開してきましたが、環境緑化事業では、どのような取り組みが展開されるのでしょうか。1980年代にスタートした花事業への取り組みについてのお話を交えながら、先進コア技術研究所の橋本昌樹さんに伺いました。

サントリー株式会社
先進コア技術研究所
部長 農学博士
橋本 昌樹

「ビールやウイスキー、お茶、これらの原料は麦であったり、蒸えに、弊社内でもすべて植物です。ゆえに、弊社内でも植物についての研究が、基礎レベルで行われてきました。例えば、品質の変を収斂するために、植物の品種改良を行う。これを育種と言いますが、育種の基礎技術を実行の商品以外に、何か生かせる分野はないかと考え、花事業への取り組みが始まりました。麦や茶葉を扱っているのなら、花よりも果物

「暮らしに強い 企業精神を宿した花事業」

橋本氏が育種から栽培容器まで全て開発



《Normal Sponge》

Normal sponge's water will **preserve**, however, it will **decrease at a certain time**.



《Pafcal》

Pafcal **maintained its moisture throughout a period of time, consistently**.

【Soil cultivation】



【Pafcal cultivation】



1 month later

Conducted 10 Years of Research

Created with 17 Different Type of Soils

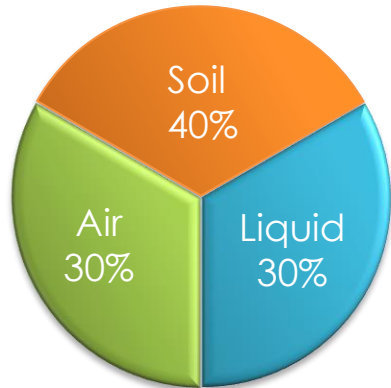
Suitable for 400 Different Types of Plants



PROJECT OBJECTIVE – HOW DID WE PLANT IT SO SUCCESSFULLY?

How to make a soil substance capable that retains Air?

The natural balance for plants in the field, "Soil"

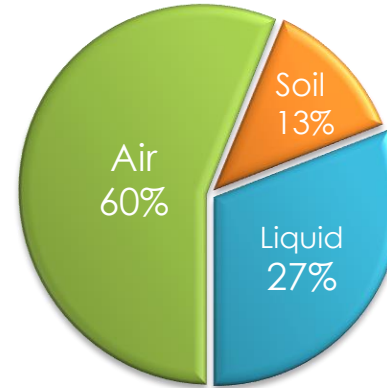


Functional Ingredient
Minerals, Organic substances

Non-functional Ingredient
Small rocks etc..

Natural Soil Proportion

The best balance for plants in urban area "Pafcal"



Functional Ingredient
Minerals, Organic substances

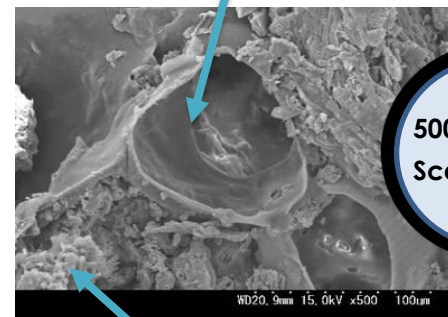
Non-functional Ingredient
Small rocks etc..

Air

The Best Proportion



Organic Foam Binder



500px Micro Scan Photo

Natural water-dispersible materials

Pafcal Soilless Media



01

Organic

Peat Soil & Polyurethane

02

Clean

No Pest (Water Circulate)

03

Balance

Air & Water Balance (70:30)

04

Long Lasting

Lifespan of 10 Years



Our Services



Export to overseas

Green Wall Design

Maintenance

Retail

Landscape Design

Workshop

Household Products



Stylish design for your home & work space



Easy Pots with Plants

Transparent outer pot makes it convenient to know when to refill.

Refill water every 7 - 10 days once, depends on the environment

This pot can fit a medium Pafcal, a soilless media for plants

Water filled cannot be higher than the inner pot

H₂O

H₂O

Table Plants

Landscape Design



Residential Area



Landscape Design



Plants Decoration



Tree Cutting



Landscaping



(Corporate Building & Office Space) Heineken

Landscape Design



Landscape Design (Bunk & Bilik Hotel)



Benefits Of Midorie Green Wall



Soilless



Auto
Watering
System



Improve
Air Quality



Increase
Property
Value



Easy
Installation



Provide
Fresh Air



Reduce
Noise



Minimal
Maintenance



Event Setup
& Branding



Energy
Saving



Temperature & Humification Effect



● 竹中技術研究所(味の素スタジアム)



Photo 3: 2012年6月観望写真
Shonan Stadium of July 2012



Photo 4: 2012年7月観望写真(観望者視点)
Shonan stadium thermal image (July 2012)

植物のCO2固定量計算(常緑樹70%+落葉樹30%)
 10年間の生育重量=地上部50kg+根部15kg=65kg/m²
 年間CO2固定量=6.5kgX(44/12)X0.5(水分)=6kg/m²

Moisturizing Effect

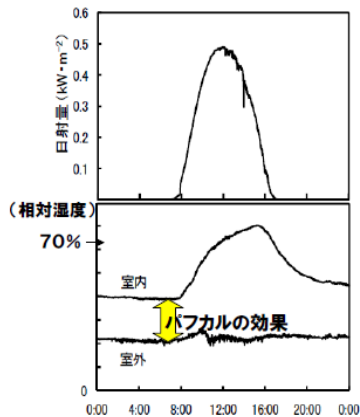


図5 日射量、室内および室外の水蒸気濃度の日変化(かべを3つ配置した場合、2011年12月31日)

<相対湿度の上昇(約20m)>

- 花のかべ1台:55%
- 花のかべ2台:約70%
- 花のかべ3台:70%超

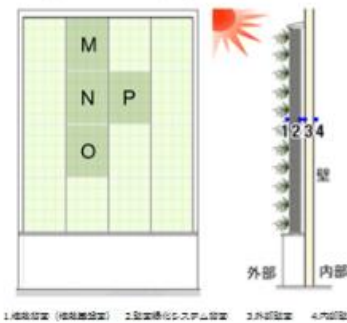
<パフカルの効果>

- 鉢植え観葉植物を置いた場合との差:20~40%

Joined-research with NUS

シンガポール国立大学との共同研究で温度低減効果を確認

パフカルを用いて、シンガポール国立大学との共同研究で壁面温度の調査を行ったところ、気温25.0℃、輻射熱32.5℃の条件下、緑化無しの場合には壁面温度が50℃以上上がりましたが、パフカルの壁面緑化を施すと30℃以下となりました。植物種によって温度の違いは多少ありますが、観葉植物が25℃~27℃で測定されることが確認できました。室内でも、緑化したエリアは緑化しない場合と比べ、約7℃低くなりました。



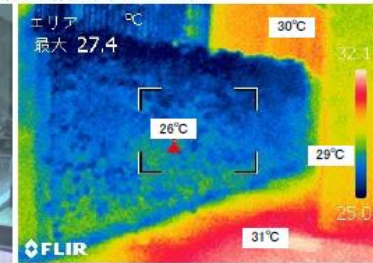
ポイントM:パフカル
 ポイントN:ワイロポントロン
 ポイントO:シセフレキ
 ポイントP:コルディリス



シンガポール国立大学との共同研究で行った壁面温度の測定グラフ

Temperature Measurement

- ホテル堀(東京)
10m² 一時給水直轄式 植物:常緑ツル性植物、常緑多年草など全10種



緑化面: 約26℃
 ブロック塀面: 約30℃
 ガラス面: 約29℃
 地面(大理石): 約31℃

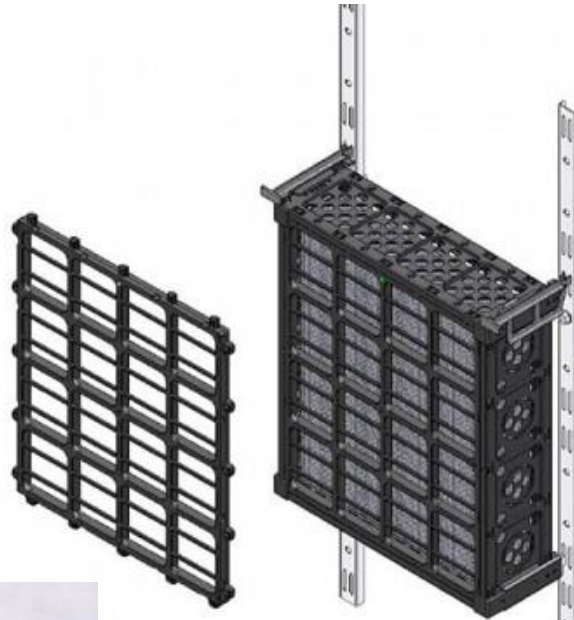
撮影日時: 2011.8.3 14時
 日照の有無: 日向
 当日の天気: 曇後時々雨
 当日の気温: 24~30℃

1st Generation of Green Wall



VERSIWALL® GM

- Geotextile
- Planting Mix
- Drain cell
- Heavy
- Soil settlement

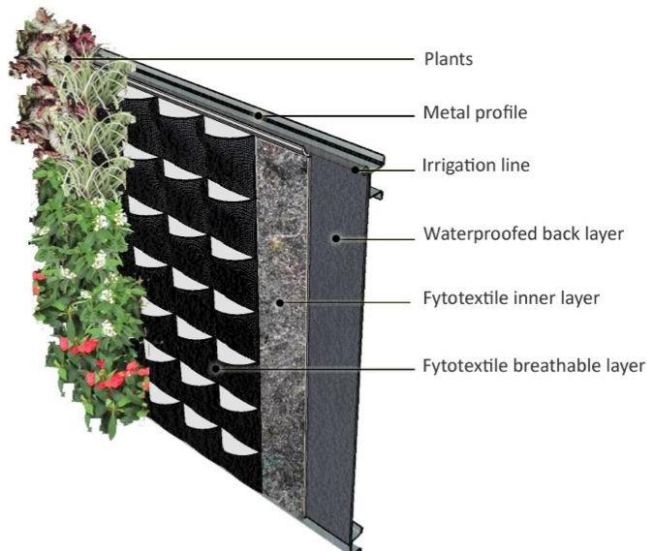
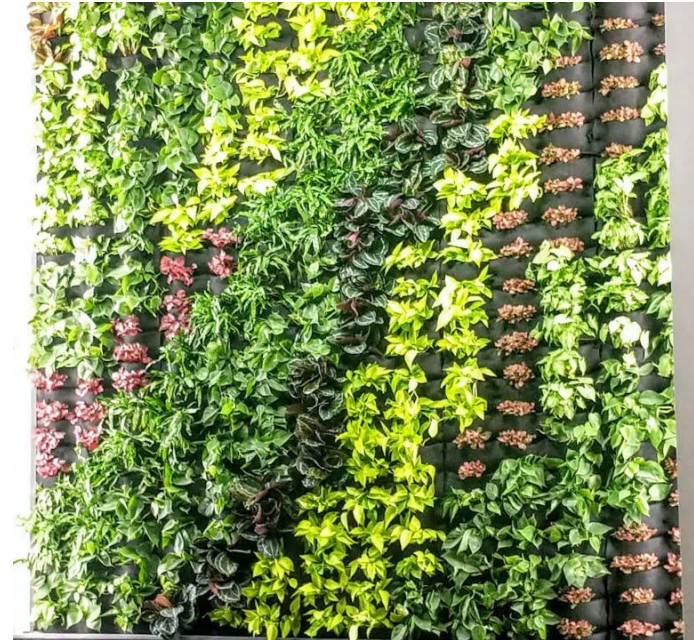


2nd Generation of Green Wall



VERTICAL POCKET PLANTER

- Black felt exposed
- Constrained rooting space
- Basic Pocket System
- Lack of automatic irrigation systems
- Offer a false economy with low initial costs but a long term struggle to keep the plants alive
- Plants painfully struggling for



3rd Generation of Green Wall



AIR BRICK WALL SYSTEM

- Connect to a building façade
- Hard soil
- Constrained rooting space

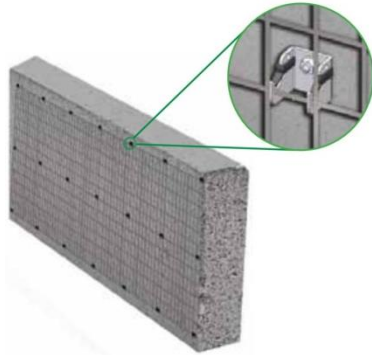


4th Generation of Green Wall



MODULAR POT SYSTEM

- Connect to a building façade
- Natural Soil
- Uses Wire Mesh



Case Study: China Construction Bank (Asia)



1. 土壤狀況 Soil condition
2. 植物現況 Plants condition
3. 硬件狀況 hardware (for example, tray) condition
4. 灌溉系統 Irrigation system

(Natural Soil System)

Site visit on 19/9/2014

Completion: 19 January 2011

Total green area: 28%



信和集團
Sino Group



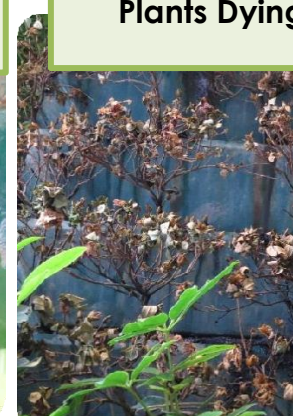
**Rusty & Ripped
Apart**



**Scorched Plants on the
bottom, due to overwatered**



Soil Settlement



Plants Dying



日本の最高品質 壁面緑化

The Next Generation of Creativity

The Highest Quality from Japan
Green Wall System





Pafcal

Black urethane-based spongy

Low maintenance

No bacteria & do not attract bugs

Perfect Balance of water & air

Easy outflow of water

Lightweight

Minimal fertilizer

Easily Replace

FUSS-Free

Clean and Eco-friendly

Normal Soil

Soil Replenishment

Regular Monitoring

Contains Bacteria & Bugs

Poor Water Retention

Water logged caused mold to grow

Soil is heavy & dense

Fertilizer application

Difficult to handle

Need to trim

Messy & caused spill out



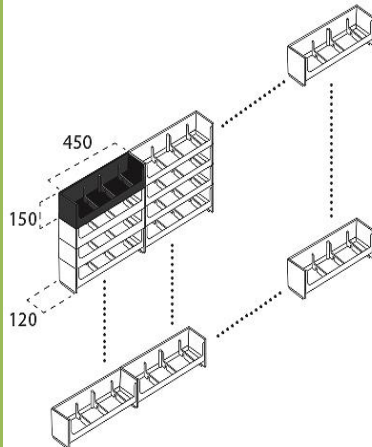
Midorie System



“**Mori No Kabe**” (literally “Forest Wall” in Japanese) is a system that uses the new “**Pafcal**” material to bring greenery to wall surfaces without the need for soil. It is substantially thinner and slimmer than conventional wall greenification systems, in which thickness and size quickly becomes a problem.

Module Structure

- Manageable size according to varying module combinations.
- Modules that corresponds with curves & corners are available.



Per/m²
-15 Planter
-60 plants
-55KG

System View

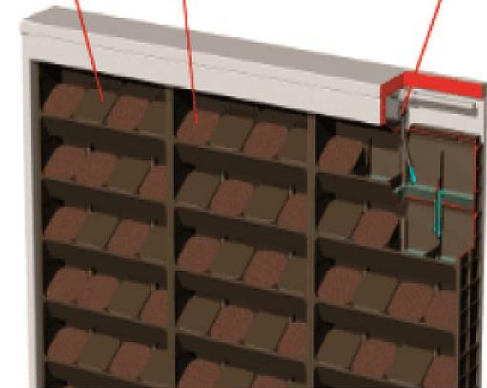
Water will be absorbed by the Pafcal in turn from top to bottom.



Cover to avoid intrusion of fallen leaves in the waterway.

Plant angle is 60°

Water supply cock which regulates the amount of discharge.



Module Structure

Plants Design



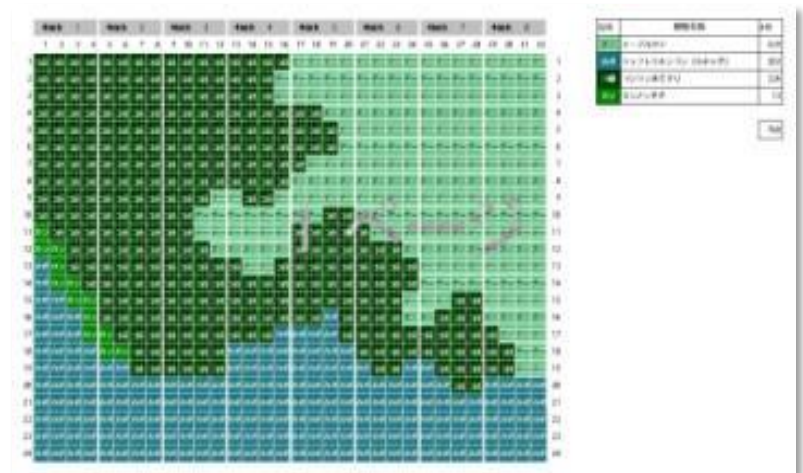
Construction Photo



Picture of Planting Outcome



Chart of Plants Arrangement



Lighting Design



Recommended Lighting Apparatus

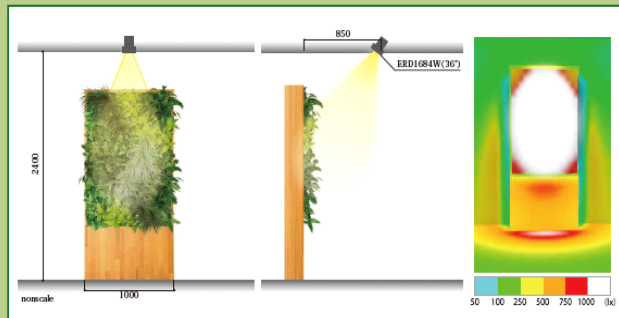
. All plants are living creatures. But they require light to survive (Photosynthesis). In the absence of natural light, artificial light works too. Lastly, all plants require sufficient amount of lights to survive and grow healthily.

* Possibility of plant fail to grow due to inadequate lighting.

Lighting Scene A

CH2400 Greening W900H1490
Lamps used: ERD1684W(36°)*1

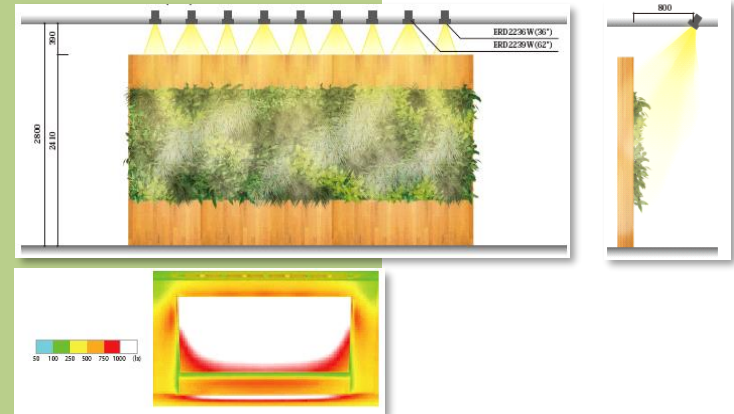
The position of the light changes according to the height of ceiling and greening surface.



Lighting Scene B

CH2800 Greening W4500H1825
Lamps used: ERD2236W(36°)*4
ERD2239W(62°)*5

Lights are shined at different angle for wider surface walls. (Concentrated and diffused)



Lighting Scene C

CH3000 Greening W900H2150
Lamps used: ERD2239W(62°)*1
ERD2233W(21°)*1

Lighting are shone at top and bottom layer on thin and higher walls.



Recommended Lighting Apparatus & Installation Method

① Embedded into ceiling

Recommended to use general low functionality LED lights

② Hanging on the ceiling

Recommended to use LED track spotlights

<p>36° ERD1684W</p>	<p>62° ERD2239W</p> <p>21° ERD2233W</p> <p>○719x541mm(φ71.4x200mm) 消費電力 44W 最大照度 330lx 光束径 1000mm 照射角 62° 光束径 2100mm 照射角 21° 光束径 1000mm 照射角 21° メンテナンス用取付金具2点付 (標準)</p>	<p>36° ERS3392WA</p> <p>36° ERS3352W</p> <p>62° ERS3355W</p> <p>21° ERS3349W</p> <p>○719x541mm(φ71.4x200mm) 消費電力 33W 最大照度 330lx 光束径 1000mm 照射角 62° 光束径 2100mm 照射角 21° メンテナンス用取付金具2点付 (標準)</p>
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About Lighting Design

Please provide details of place to install prior to submission of lighting design. eg. Plan layout, Developed elevation, Top view) Select the plants' species for individual designs based on lighting at different locations.

Psychological Effect



方法説明

室内での壁面緑化「花のかべ」の心理効果 (SD法による因子分析)

かべA



かべB



かべC



デザインの
特長

植物10種類、形状、色、豊富

植物5種類、明るい緑、段階的な色変化

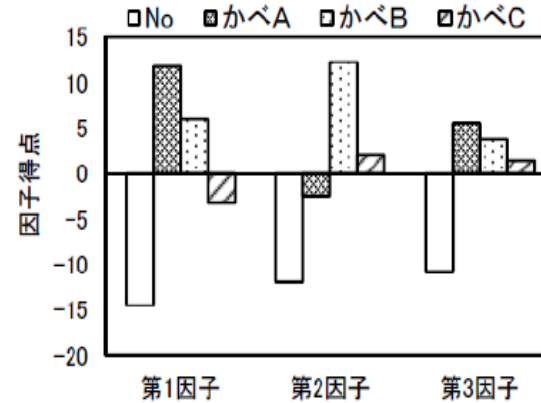
植物1種類、濃いグリーン

<分析結果>

因子	因子1	因子2	因子3	因子4
マイナス				
緑陰が深い	0.574	0.661	0.201	
緑陰が浅い	0.597	0.558	0.228	
葉の緑の濃さ	0.540	0.523	0.227	
葉の緑の濃さ	0.530	0.514	0.141	
葉の緑の濃さ	0.501	0.577	0.224	
葉の緑の濃さ	0.475	0.587	0.204	
葉の緑の濃さ	0.465	0.559	0.403	
葉の緑の濃さ	0.450	0.472	0.658	
葉の緑の濃さ	0.370	0.217	0.254	
葉の緑の濃さ	0.275	0.445	0.204	
葉の緑の濃さ	0.258	0.244	0.194	
葉の緑の濃さ	0.241	0.303	0.600	
葉の緑の濃さ	0.200	0.340	0.550	
葉の緑の濃さ	0.190	0.322	0.550	
葉の緑の濃さ	-0.218	0.304	-0.312	
葉の緑の濃さ	0.207	0.318	0.308	
葉の緑の濃さ	0.400	0.455	0.152	
葉の緑の濃さ	0.220	0.377	-0.331	
葉の緑の濃さ	0.402	-0.601	0.001	
葉の緑の濃さ	0.260	0.471	0.642	
葉の緑の濃さ	0.670	-0.214	0.708	
葉の緑の濃さ	0.662	0.300	0.708	
葉の緑の濃さ	0.594	0.420	0.618	
葉の緑の濃さ	0.380	0.426	0.418	

SD法による因子分析とは:
「よい」「わるい」というように対となる形容詞を両極にとり、その間をスケール化したもの。定性的な情報を定量的に変換することができる手法で、イメージ調査などによく使用される。

「花のかべ」のデザインの違いによる心理効果



<かべA>

—第1因子が有意

「情熱的」「華やか」
「自然」「潤い」



心の動きが促進

<かべB>

—第2因子が有意

「安らぎ」「気持ちよい」
「自然」「潤い」



心の落ち着きが促進

<かべC>

—平均的

「自然」「潤い」



心のやすらぎ

* Test result by Ehime University

Not only we can save energy, we can also feel the psychological effect after the implementation of green wall

Monthly Maintenance



***Monthly maintenance is recommended**
***Proper disinfection, fertilization, and etc.**

Work Content

Work Content			JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	SUM
A. Check	Confirming growth of plants & irrigation facilities	Verify the Greening System and at the same time reassure the growing condition of the plants	●	●	●	●	●	●	●	●	●	●	●	●	12times/yr
B. Trim	Trimming and pruning over-length plants	Not only trimming, but also concern on protecting the growth of new sprout, as well as pest control	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	When Needed
C. Fertilize	Using fertilizer (Liquid, Solid)	Choosing liquid or solid fertilizer depending on plants' species, provide sufficient nutrients			●		●		●		●		●		5-6times/yr
D. Disinfect	Spraying pesticides to prevent pests and diseases	Focus on pest prevention, try to eliminate pests before they're grown, choosing pesticides accordingly			▲		▲		▲		▲		▲		2-3times/yr
E. Leafing	Removing dried leaves	Shaping plants, avoid pests and diseases caused by bad lighting or air flow, remove dried and over-dense leaves	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	When Needed
F. Replant	Replacing withered plants and so on	Switch away withered and unpleasant- looking plants, communicate with clients if required to	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	When Needed

● Implement ▲ When needed

Comparison with others



<Others>



土苗袋 花苗 架台
多数の点滴チューブ

<Midorie>



less than
10% of plant
mortality
per year. ✓



給水チューブ
ユニット
パフカル苗
循環水
タンク

ポンプ(タイマー)



Midorie
Soilless Greening

- (1) No leakage (sealed seedling box, recycled water)
- (2) Water conservation design (reuse recycled water, timer system)
- (3) Unique indoor greening technology (plants design, lighting)
- (4) Clean and easy to maintain.

Freedom of Creativity





2013年 白山



2014年 黄山



2016年 丝绸之路



2018年 江山如画



Beijing Garden Forest Museum

(北京園林博物館)

258 m² indoors

Beijing Garden Forest Museum will change their Green Wall Design with 30% of plants, whereby 70% of the plants will be reused as the picture shown above.

Japan Project



京都Yodobashi Camera 1,120m²



大阪Yodobashi Camera 2,000 m²



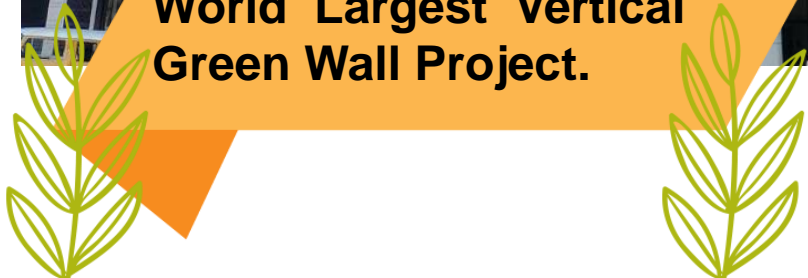
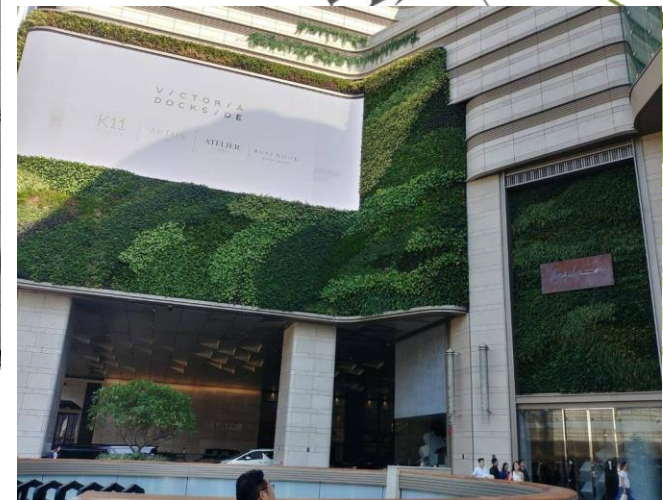
Hong Kong Project



Project :HK New World Centre
Size 6400m²



**World Largest Vertical
Green Wall Project.**



Work Projects



Hong Kong



TKO 2,000m²

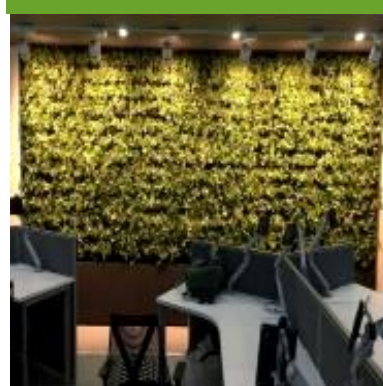
Year 2018

Taiwan



Taipei Young Living 29m²

Philippines



Financial Times 30m²

Year 2017

Dubai



Seventh Heaven 550m²

Year 2017



New World Center 6,400m²

Year 2019



Tong xing Raiya Game 14.75m²



Demonstration room 8m²

Year 2018



Starbucks 15.19m²

Year 2018

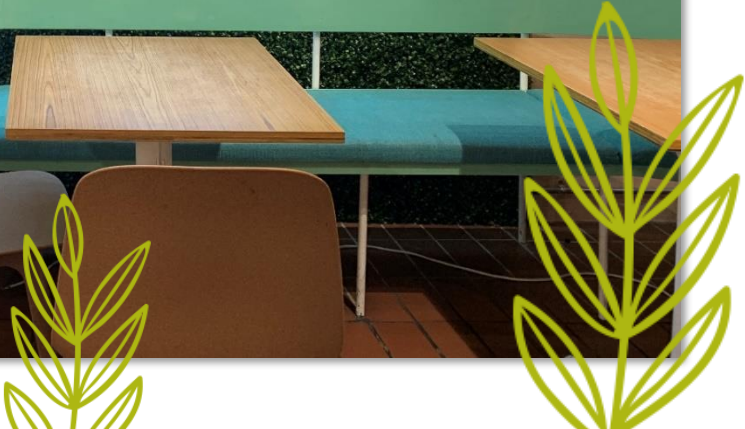


Jumeirah Group Head Office 15m²

Year 2018



Midorie Owls Café (MyTown) 5.2m²



Malaysia Projects



Microsoft Malaysia Office 13.12m²



New Chapter Owls Cafe 13.34m²



Malaysia Projects



KLIA Total 50m²

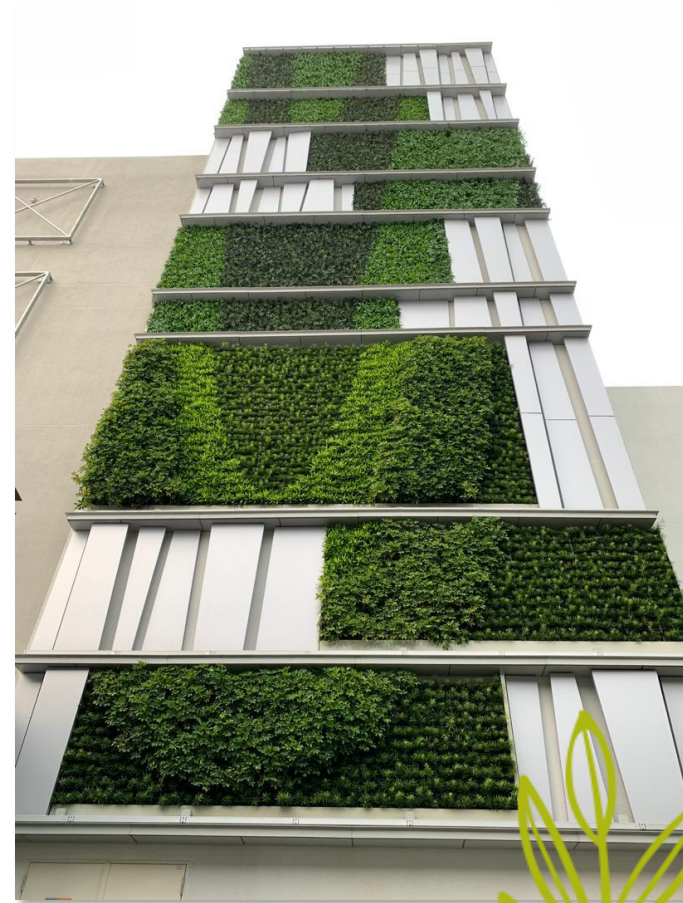




Setia Alam Eco World Bungalow 52m²



AEON Maluri 150m²



2018 Achievement 430 Project 10,000m²
Distributor Sales RM230 Million

Malaysia Event Projects



Date : 1 Mac - 31Mac 2019
Event Setup for L'Occitane



Malaysia Event Projects



Date : 1 August 2019-1 September 2019
National Day setup- Pavilion



Celebrations



Midorie Green Wall System is an affordable and space efficient option to bring your events to life.

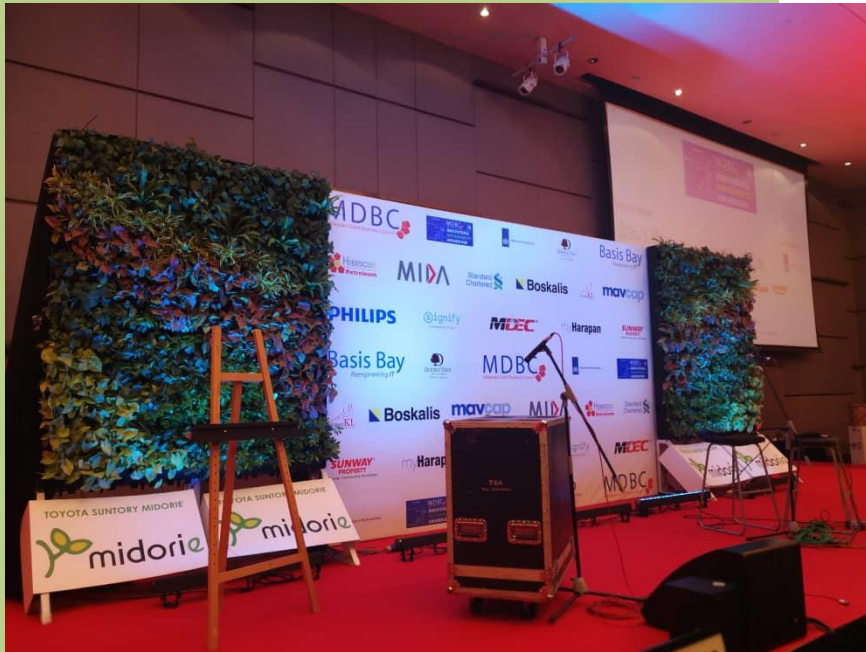
Midorie "Mori No Kabe" is a soil-less system with Pafcal, that can keep plants in moist condition to survive without water for two to three day event. It is easy to install for anyone to create a dramatic display of living art for any occasion.



Malaysia Event Projects



Rental Package 1
3600mm (L) x 2100mm (H)
= 7.56 m²



Rental Package 2
5400mm (L) x 2100mm (H)
= 11.34 m²



Go Green Go Clean



Looking Forward to **Collaborate** with you

Address

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