



Volcanic soil media for plant growth in green infrastructures

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BOOTH #413



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Contents of this presentation:

- Brief introduction of the **company Europomice** and its products
- **What makes volcanic rocks interesting for green infrastructure in urban environment**
- Significant results of some tests and experiments about the use of **volcanic rocks in green roofs**
- Examples of green roofs and green infrastructures built with volcanic media
- How to get in touch with Europomice representatives



Headquarter in Milan

Production&Logistic

Italy



Family owned company
since 1901,
now Maffei's 4th generation

Gross sales \$ 7 million - about 300,000 tons yearly

over **70 %** of the products sold to the green sector
nurseries, landscaping

LAPILLO



Vulsini Volcanite from the Pleistocene period, naturally calcined at high temperature,

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PUMICE

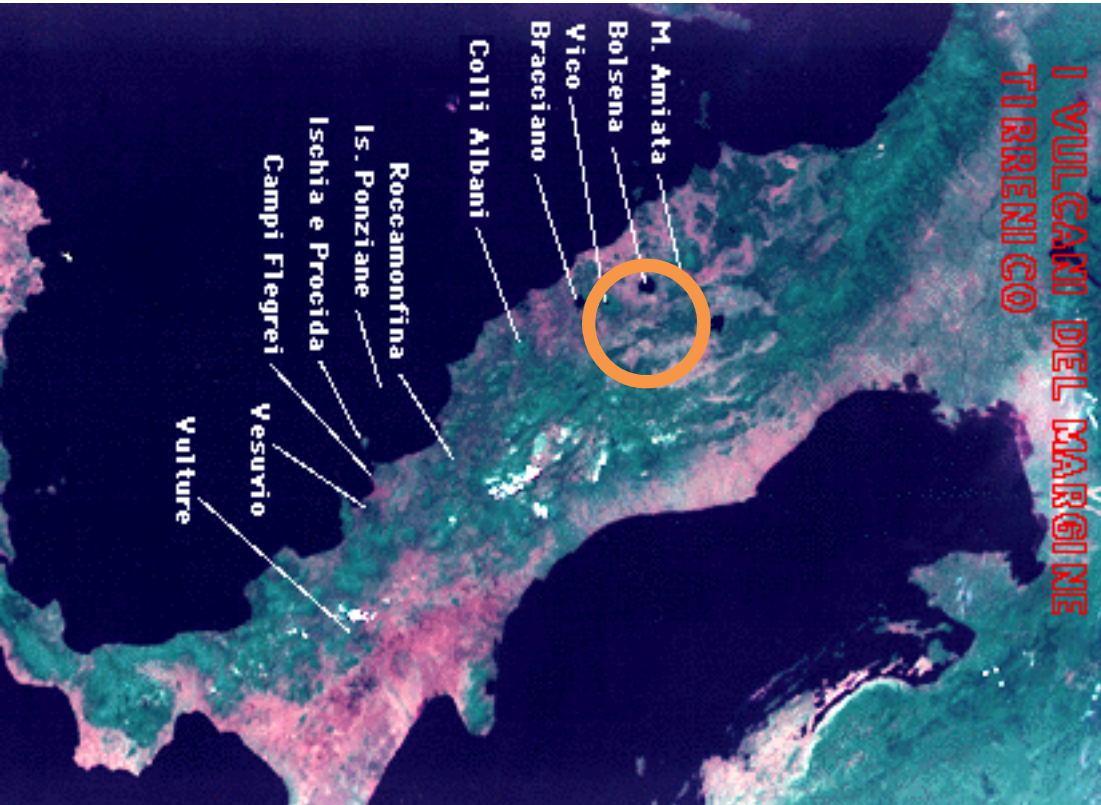


ZEOLITE



Zeolite, ZEOLITITE CHABAZITE TYPE
Zeolite total content ca. 58% (Chabasite 45%;
Phyllipsite 13%)

ENGINEERED SOILS made with VOLCANIC blends





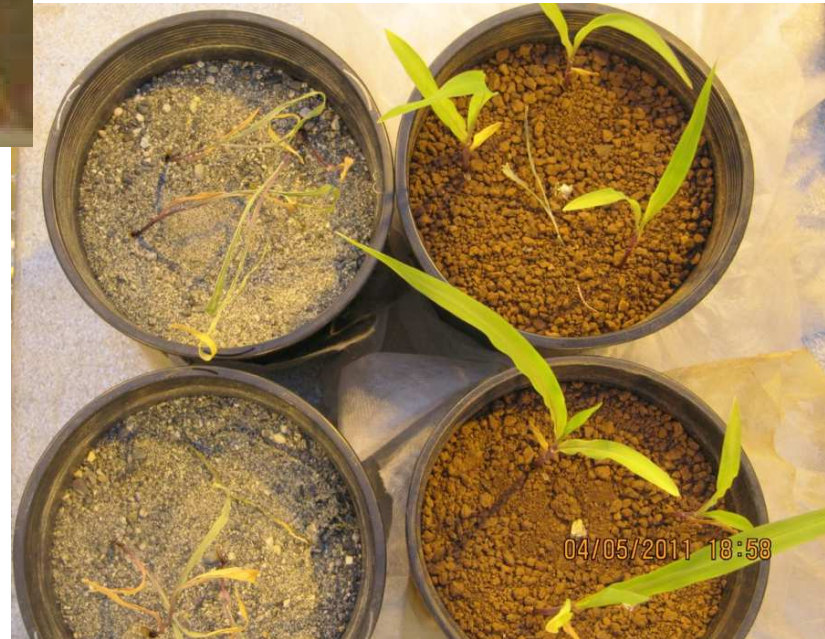
<http://z.about.com/d/geology/1/0/M/W/scoria500.jpg>

The physical structure of these rocks makes them very interesting for roots and microbes....



Beach sand - riverine sand

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Corn plants after 5 weeks without water on riverine sand (left)
and sand of lapillo (right)

Picture from research trials by Alessandra Zuin MSc,
MLA, UW- Horticultural Center, Seattle WA, 2010-11



Lapillo

The internal part of the rock is in fact composed of an **enormous quantity of ducts** having a very small/medium diameter, **intercommunicating between themselves and also externally.**



Pumice

alveolar texture of remarkable lightness, high porosity, it provides great **water retention, slow release of liquids** and great thermal insulation

Some significant Results of comparative trials with



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Comparison between Zeolites of different origin		
Sample - Zeolites	Water holding capacity (ml/liter)	Cation Exchange Capacity CSC (meq/100g)
Cabasite (Europomice, Toscana, Italy)	265	16,98
Clinoptidolite (Sardegna, Italy)	197	19
Clinoptidolite (Romania)	206	16,91
The Zeolite Cabasite (Europomice) shows the highest water holding capacity		

Trials by Landlab, Italy landlab.net



GREEN ROOF MEDIA

EXTENSIVE

- mix of Sedum: 10% *Sedum acre*, 15% *Sedum reflexum oxbow*, 15% *Sedum reflexum angelina*, 20% *Sedum atropurpureum*, 15% *Sedum album*, 15% *Sedum rubrotinctum*, 10% *Sedum floriferum*.

INTENSIVE

- mix of grasses: 25% *Lolium perenne*, 25% *Festuca ovina*, 25% *Poa pratensis* e 25% *Festuca arundinacea*.

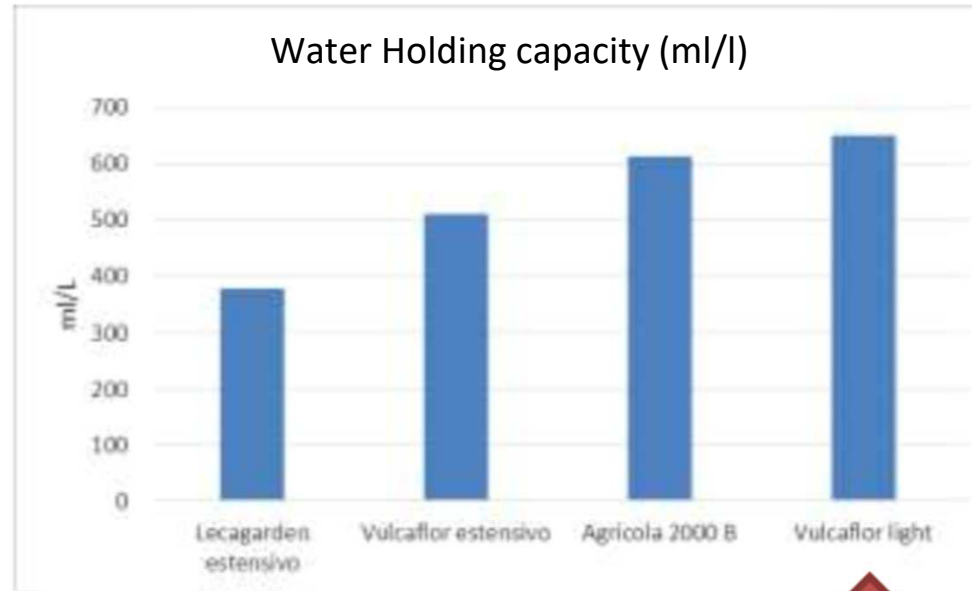
Fertilizer applied: none

Media: 4" deep, lined by geotextile over and gravel

Comparative trial of #7 different media



MEASURES : 1. Volumetric Water Content (VWC);
2. area covered by the vegetation (LGC) over time, measured by Digital Image Analysis (DIA).



Vulcaflor light (Europomice) shows the highest water holding capacity.

EXTENSIVE



Lecagarden



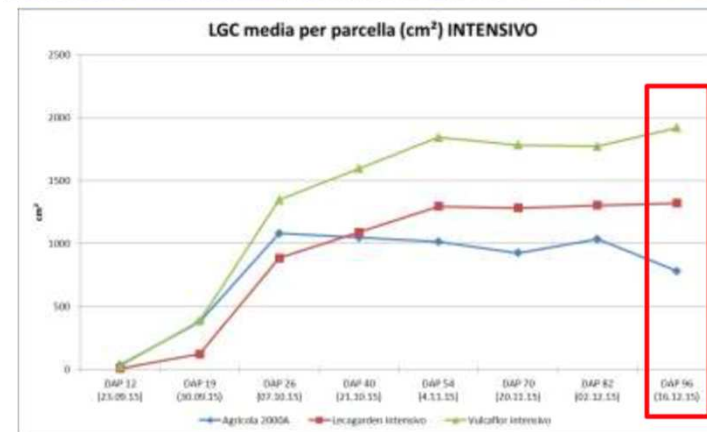
Vulcaflor Light (Europomice) -

Vegetation coverage 34 days after planting (DAP) - measured by image digital analysis

The plants (Sedum) **initial growth** in **Vulcaflor light** (Europomice) **was the fastest**: after 2 weeks (DAP 15) the vegetation coverage was twice the size of the other media.

After a month (DAP 34) **Vulcaflor light still showed the largest vegetation coverage**: +50% compared with Agricola 2000 B e + 80% compared with Lecagarden extensive.

INTENSIVE



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Vulcaflor intensive showed the **highest vegetation coverage** compared with the other media on trial (+ 45 % vs Agr. 2000 and + 145 % vs Lecag). After 40 days Vulcaflor intensive maintains the highest vegetation coverage (+ 40%).



LifeMedGreenRoof Project Storm water management

LIFE12ENV/MT/000732



LifeMedGreenRoof Project
MEETING ENVIRONMENTAL TARGETS

Project partially financed by the European community,
The LIFE programme is the EU's funding instrument for the environment. co-financing pilot or demonstration projects

In 2015 the EU financed a study for developing Media for Green roofs in Malta. All the 6 soil media that passed the preparatory trials include volcanic rocks such as pumice and lapillo.

Europomice **volcanic rocks have been extensively tested by Universities** and research centers:

University of Milano, University of Padova, University Federico II Napoli, University of Modena e Reggio, University of Di Malta

Landlab, MAC Minoprio

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In the following table and chart the composition of the selected growing media is being reported.

Table 2 Components and percentages of use (volumetric) for the selected growing media

	MAC7*	MAC7/T	MAC7/FC	TA	MT1	MT2
PUMICE				45	35	30
PUMICE	30	30	30			
LAPILLUS					40	35
EX CRASHED CLAY	40	40	40	30		
peat 0-25	15	20		10	15	10
coconut fiber 0-25			20			
green compost	5	10	10	9	10	10
biochar	10			6		15

* There are two different versions of MAC7: MAC7/IT (in use in Italy) and MAC7/MT in use in Malta. The difference between these substrates is the type of biochar used in the mix. In the Italian version biochar is in pellet form, while in the Maltese version chippings are used.

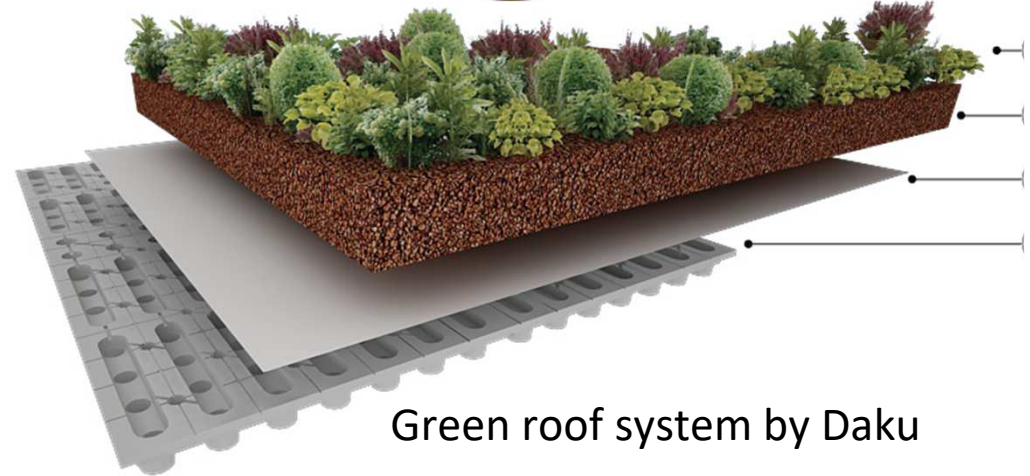
COLLABORATIONS

Europomice has teamed up with numerous companies, Italian and international.

Europomice provides soil media tailored to the client's specifications

- Zinco Italia
- Perlite Italiana
- Daku Italia
- Peverelli
- Tegola Canadese
- Powergrass
- Euroambiente
-are some of the clients

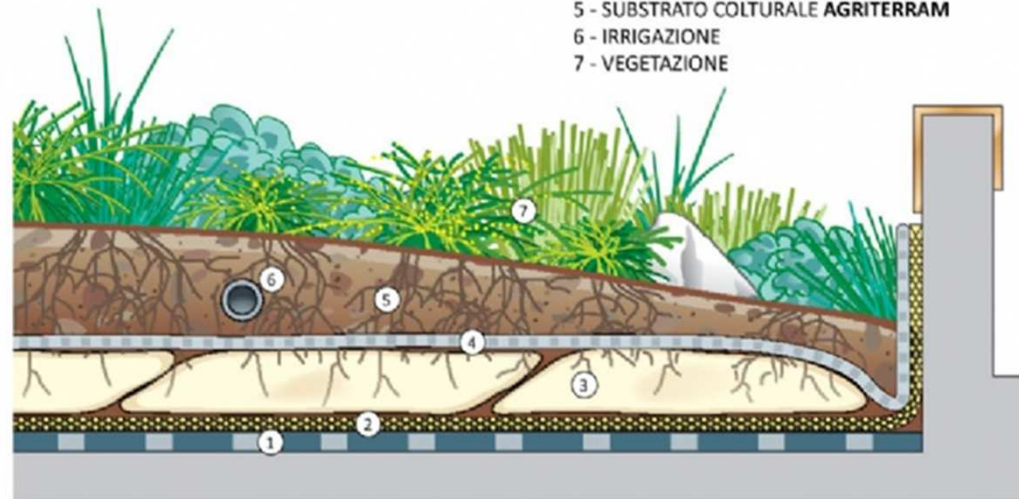
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Green roof system by Daku

STRATIGRAFIA PERLIROOF
GIARDINI PENSILI ESTENSIVI A SEDUM

- 1 - ELEMENTO DI TENUTA ANTIRADICE
- 2 - DRENAGGIO ECODREN
- 3 - DRENAGGIO ED ACCUMULO IDRICO IGROPERLITE
- 4 - ELEMENTO DI FILTRAZIONE DRENALIT
- 5 - SUBSTRATO CULTURALE AGRITERRAM
- 6 - IRRIGAZIONE
- 7 - VEGETAZIONE



Green roof system by Perlite Italia - patented

Green roofs realized with volcanic soils by

✿ ... transformation of the old **Alfa Romeo's** industrial site - 2013

Owner: Euroambiente Srl per Acacia 2000 S.r.l. - Iper Montebello S.p.A.

Planning: Studio Canali, Milan ITA

Landscape architect: Studio Canali and Land Milano

Director: Arch. Andreas Kipar

landscape contractor : Euroambiente Srl

Green roofs areas total: **150,500 sq.ft.**



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Draining: SUPERGARDEN® ed ECODREN SD5
Water storage layer: IGROPERLITE® type T2, variable depth 10-20 cm (4-8") depending on the kind of vegetation

Compensation volume water storage / draining : Perlite type T1 depth 50 cm (20")

Soil media : AgriTERRAM® TVS depth 10 - 20 cm (4-8") depending on the kind of vegetation

Vegetation: lawns, shrubs, ground covers, vines, trees

Irrigation system: drip line for shrubs and trees, and pop up

Green roofs realized with volcanic soils by EUROPOMICE

- ✿ ... green roofs and parks between the residences of Via Spinola, Milan, Italy created over the underground garages - year 2013.

About 110,000 sq.ft of intensive green roofs, Perliroof[®] System, with lawn, shrubs and trees, landscaped by Euroambiente SpA



Green roofs realized with volcanic soils by EUROPOMICE

☼ ... one of the most recent - 2017

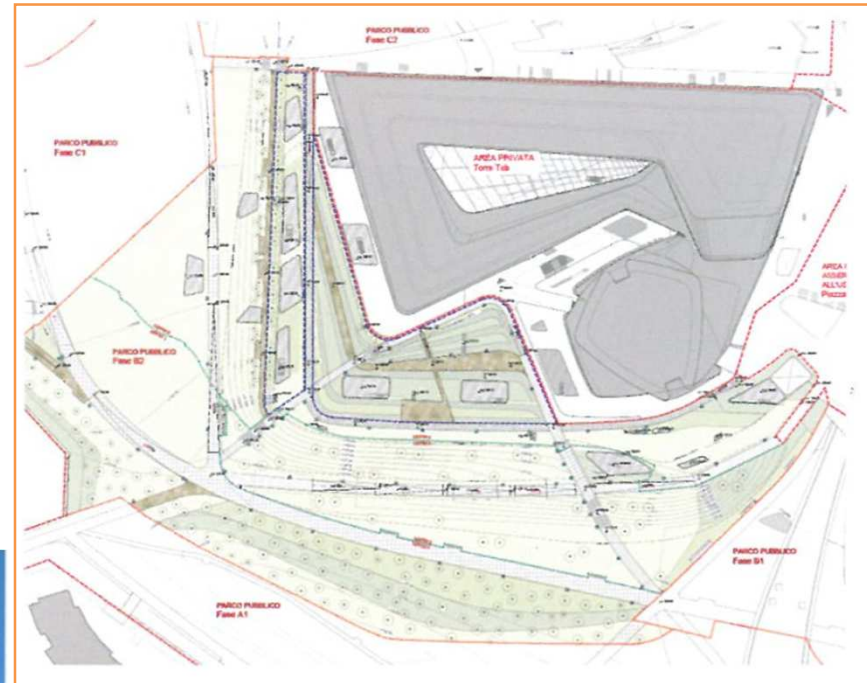
Owner: CityLife SpA

Architect: **Zaha Hadid**, London, UK

Landscape Architect: P'Arcnouveau, Milan
ITA

Yard Director: Studio Inpro, Turin, ITA

Landscape Contractor: Euroambiente-
Peverelli Srl



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Green roofs realized with volcanic soils by



The roof gardens at the base of the tower designed by Zaha Hadid

Draining: ECODREN SD5

Water storage layer: IGROPERLITE® of different types and variable depth 10-30 cm (4-8") depending on the kind of vegetation

Compensation volume water storage / draining : IGROPerlite® of different types and depths

Soil media : AgriTERRAM® TVS depth 10 - 30 cm (4-12") depending on the kind of vegetation

Vegetation: lawns, shrubs, trees

Irrigation system: drip line for shrubs and trees, and pop up for lawns



KEY POINTS



✓ **Plants “like” volcanic soils**

→ They are fertile because of their physical structure and chemical properties (BTW microbes also like them)

→ **Volcanic rocks are clean:** free of toxic elements, residuals or weeds

→ Europomice pumice, lapillo and zeolite, due to their open cell porosity and high cation exchange capacity, **perform very well** in terms of water holding capacity and habitability for plants

✓ The use of **volcanic materials in engineered soils, with enhanced properties, is well established in Europe**

✓ Europomice can provide soils, or single components, matching the client specifications and standards (ASTM, FLL) for GREEN Infrastructures, including green ROOFS

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Thank you !