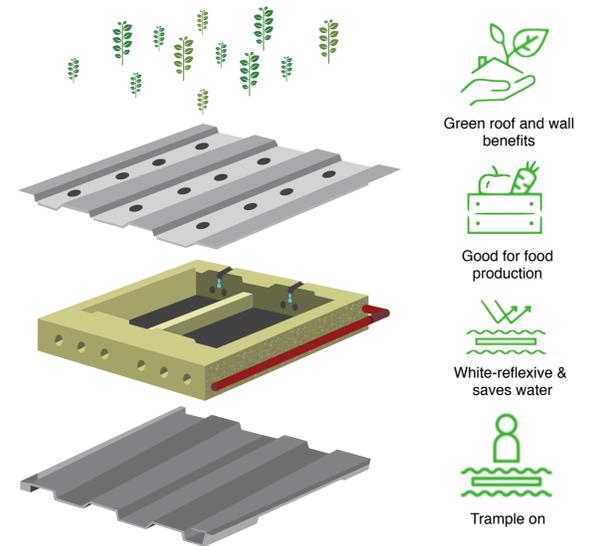
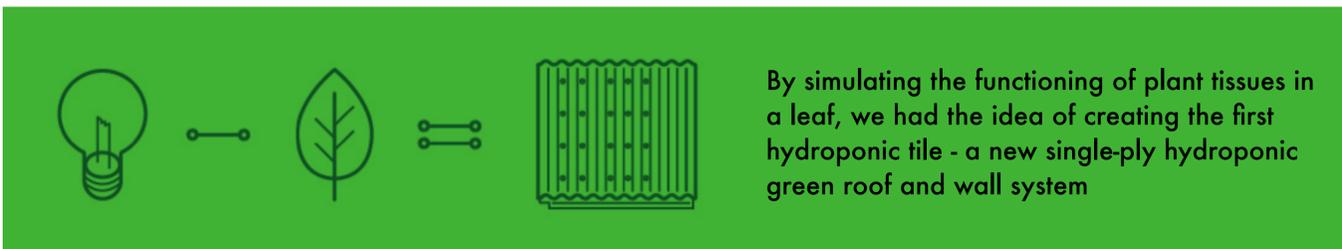




Biomimicry for the next generation of green roof products

- Green roofs are expanding all over the world and already represent a significant market in Europe, which installed 11.3 million square meters in 2015.
- Meanwhile these numbers represent about 0.1 percent of the global roofing market (which installed more than 11 billion square meters in 2018). This micro-percentage also demonstrates the huge potential for growth and impact that green roofs can deliver in the coming years.
- One problem is that current green roof technologies are coatings for already waterproofed structures - usually a flat roof (most of the time a slab) with a waterproofing membrane. Thus, roof gardening is not suitable for all kinds of buildings.
- In fact, 97 % of roofs in Brazil are not flat, being covered with clay or fiber-cement tiles, or metal sheets, hence not being able to be greened due structural restrictions and inherent adaptation costs.
- While we need to evolve as a movement to raise more governmental aid for market development, we also need to move toward more appropriate technologies
- With that in mind, we challenged ourselves to create a product that would not be an additional item in the building. The idea was to simplify the application of green roofs and, mainly, not to depend on a waterproofing membrane. To this end, we decided to seek inspiration in nature:
- This is a sandwich panel that **does not require a slab or waterproof membrane**, delivering greening and water tightness in the same product for the first time.



Instead of the traditional layering, the new system is installed as a conventional thermal sandwich panel, where overlapping and screws guarantee tightness and stability for (almost) flat roofs to a 90° inclination wall. Lighter than a regular clay tile, its dry weight is 10 kilograms per square meter. The saturated weight is about 45 kilograms per square meter, depending on plant selection. After assembling the panels over the roof structure, simply insert the drip irrigation lines and connect them to a water supply attached to a hydroponic system, so the internal irrigation circuit board will distribute the water without overloading the weight of the system.



Brazilian ground-cover *Callisia repens* - Instituto Cidade Jardim (Brazil).



Lettuce (*Lactuca sativa*) grown under controlled conditions - Bologna University (Italy).



Wheat (*Triticum* spp.) production - Instituto Cidade Jardim (Brazil).



Bean (*Phaseolus vulgaris*) production - Instituto Cidade Jardim (Brazil).



Albergines (*Solanum melongena*) and many vegetables - University of Applied Sciences of Neubrandenburg (Germany).



Leak test and rain simulation being carried at Brazilian Institute of Technology, at São Paulo University - IPT (Brazil).



Cultivation being tested at several slopes - Bologna University (Italy).

It is well suited for extensive green roof cultivation with species commonly used for landscaping, but its greater potential resides in **intensive urban agriculture**, allowing the cultivation of vegetables and grains. The tiles also possess excellent thermal and mechanical resistance, allowing people to walk on its surface for maintenance.

The results obtained until now were exciting and reinforced our belief in the market potential of the product. Our hydroponic tile presented positive results in all the cultivation tests carried out in Brazil, Italy and Germany, and was also approved in all the initial characterization tests carried out by IPT (Brazilian Institute of Technology, at São Paulo University), attesting that the product already complies with NBR 15.575-5:2013 (House Buildings: Performance - Part 5: Roofing Systems), or in other words: it does not leak, supports trampling for maintenance and is impact resistant. We also had positive advances in industrial development (validated mold design in industrial tests, selection of raw materials and good production practices, map of initial costs for price formation) and the commercial strengthening line (branding, visual identity, digital marketing campaigns, a new patent granted in Brazil and patents deposited in Europe and the USA). Now we are conducting tests for fire safety in order to let it minimally ready for the market. This is our contribution to make green roofing suitable for a larger share of the overall roofing market.



Contact: Sérgio Rocha - CEO at Instituto Cidade Jardim
sergio.rocha@institutocidadejardim.com.br
 (+55) 11 98322 1728
www.institutocidadejardim.com.br

