URBAN CROP SOLUTIONS

End-to-End Indoor Farming Solutions Provider

www.urbancropsolutions.com

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p.03 About Us

At Urban Crop Solutions, we have been combining factory engineering and indoor plant biology to offer end-to-end solutions for indoor vertical farming since 2014.

It all starts with the crop, and the needs of your market. Based on years of research and real-life trials in our own research centre, we help you select the right plant varieties with the right growth algorithm for the requirements of your end-user.

We design, manufacture, and install automated plant factories that can scale to the needs of your business. We help you in your journey to yield and support your first harvest. With us, you'll be able to grow any crop under LED light anywhere on the planet, year-round. Let us join you in your journey to profit.

Sustainability

The UN Sustainable Development Goals (SDGs) are 17 objectives that were established by the United Nations in 2015 to enable people to live on a more sustainable planet by 2030.
Our solutions contribute substantially to eight of these 17 goals.

Did you know?

We are located in Waregem, the agricultural heart of Belgium. Situated in the province of West-Flanders, Waregem has been a farming community with small-scale farmers and the cotton industry since the Middle Ages.

p.05 Contract Research

Indoor Biology

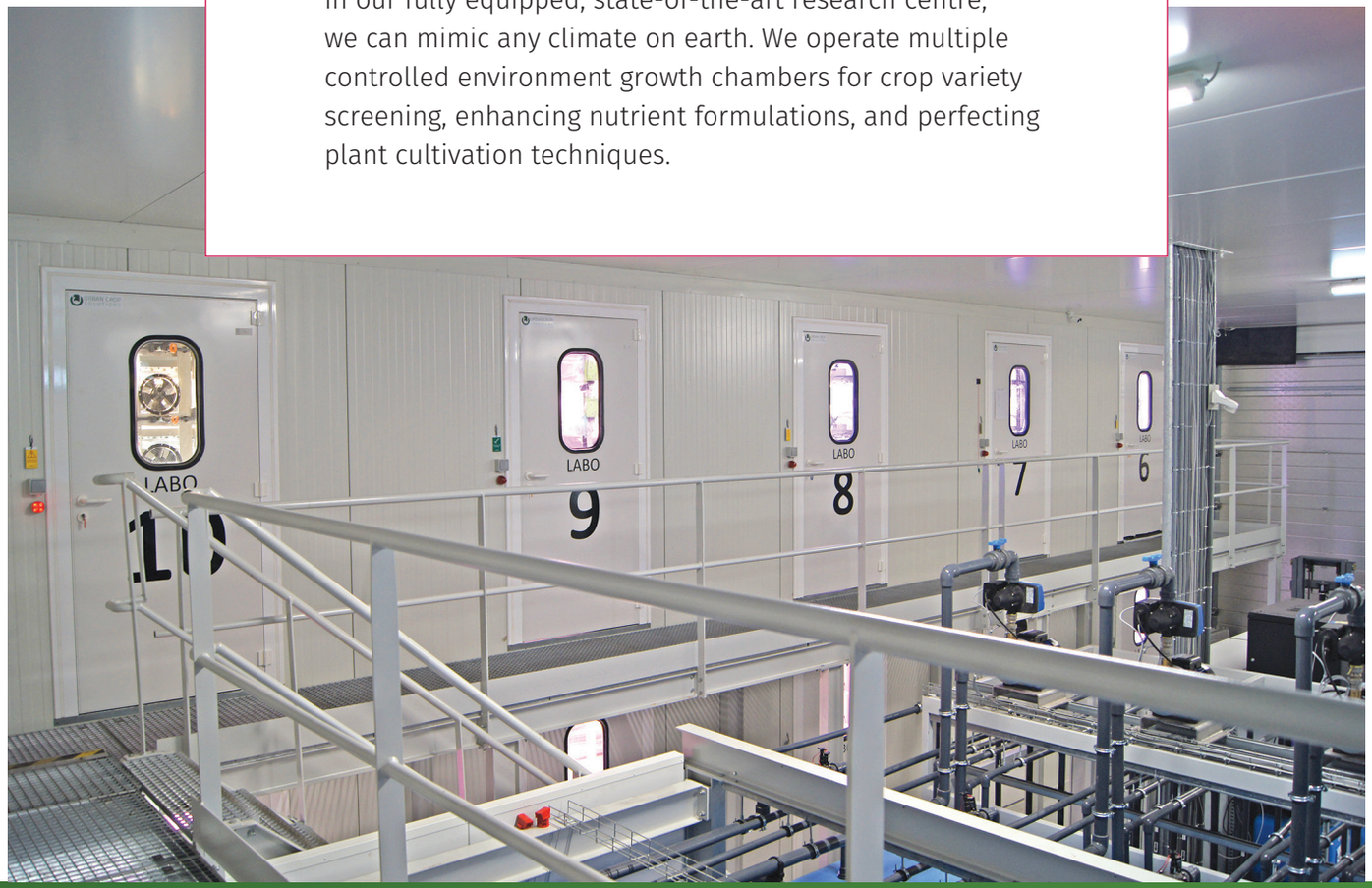
The seed genetics available today have been cross bred for decades to optimise conditions in a traditional open field or greenhouse cultivation. The development has focused on disease resistance, drought resistance and yield, with maximum response to light not a concern.

The reality of an indoor growing environment is that the requirements are the exact opposite. Plants receive exactly what they need and are protected from pests and weeds. Our plant biology team therefore has been searching for the plant genetics that maximise biomass growth with minimum input of resources.

A plant growth algorithm is a predefined set of operating procedures (seed planting, germination time, transplanting method, etc.), and approximately 45 parameter settings (LED intensity and spectrum, daylight hours, temperature, humidity, irrigation on/off timing, nutrient mix, substrate composition, etc.).

Our Research Centre

In our fully equipped, state-of-the-art research centre, we can mimic any climate on earth. We operate multiple controlled environment growth chambers for crop variety screening, enhancing nutrient formulations, and perfecting plant cultivation techniques.



Our Capabilities

PlantFactory simulation lab

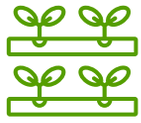
Variable LED light spectrum lab

Nutrient formulation research

Germination and propagation

AI & data collection

Ebb & Flow



Gully irrigation lab

PharmSpee™ Platform

To test yields and improve plant growth algorithms in our commercial solutions, we also operate full-scale commercial plant factory grow modules. We have developed our own LED light technology and continue our experiments to enhance plant response to LED light spectrum and intensity. Our team of indoor plant scientists have found and facilitated the ideal controlled environment for plants to thrive.

Multiple elements are considered to identify the optimal solution for maximising your yield. One of these elements is the irrigation system, such as benches or gullies. However, other parameters also have an influence, such as:

- Distance between the crop canopy and the LED lights, which can limit the maximum height to which the crop can grow.
- The intensity and spectrum of the LED lights, which improves with each new generation.

For practical reasons, it is not possible to test every single combination of these parameters.
The folling is a simple calculation to illustrate this:

- Testing every seed of 220 cultivars under 3 different light intensities x 3 different ‘light-to-canopy’ distances x 3 different irrigation setups x 2 types of plant positioning = 10,800 possible combinations.
- To perform trials for each of these combinations for an average of 40 days per trial, one would need 432,000 days of laboratory testing. For 10 labs, this would be the equivalent of 120 years of continuous testing in 10 labs concurrently.

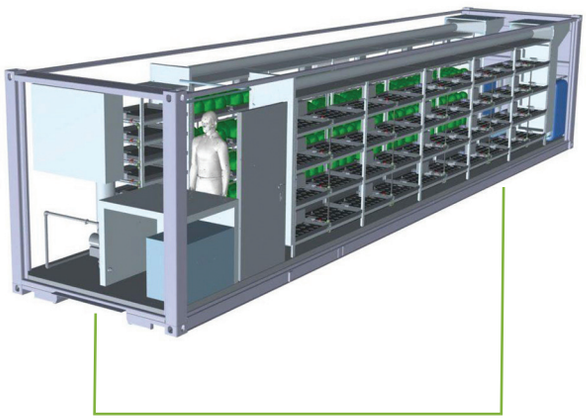
We don’t believe in standard solutions. Why?

Optimal plant growth in every single climate has its own set of requirements. That is why we reconfigure all our systems to match those of your product and business operations. We carefully select the components you need to achieve the most effective configuration and algorithm for you. We have the highest precision when it comes to controlling all environmental variables: temperature, humidity, LED light, air flow, irrigation, and nutrient formulation.

For more information, and to receive our crop guide, contact us at **sales@urbancropsolutions.com**.

Plant Factories

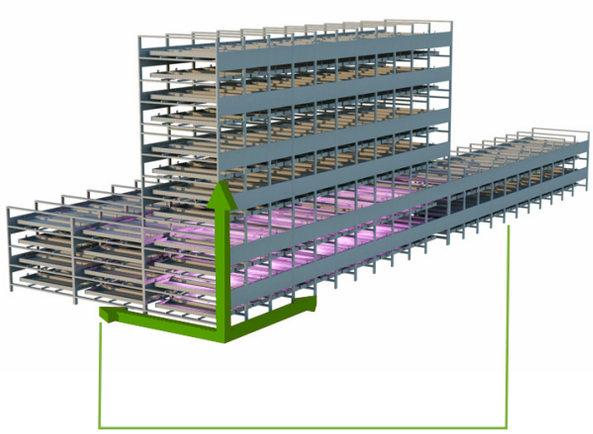
Our factory engineers understand that it all starts with your crop's specifications. Based on our indoor plant biology 'grow-how', our team of engineers have developed dedicated LED lighting, flexible fertigation, a dedicated climate system, and remote access control software.



FarmFlex / FarmLab

Fully customisable rack set-up and research system

The FarmFlex/Lab features a growing surface of up to 55 m^2 (592 sq. ft.) and can be engineered for full flexibility, with upgrades for LED lighting plans and extra software controls. All of this can be tailored to a specific crop and/or growth phase. The farm works with an ebb & flow irrigation system on growing benches and is fully equipped in stainless steel. This traditional design, a standard in the industry, requires a commercial grower to walk into the farm for planting and harvesting. It is best suited for research or small commercial operations. Our customers have used the FarmFlex/Lab successfully for the research of wheat, banana plant propagation, flowers, hemp, and many others.

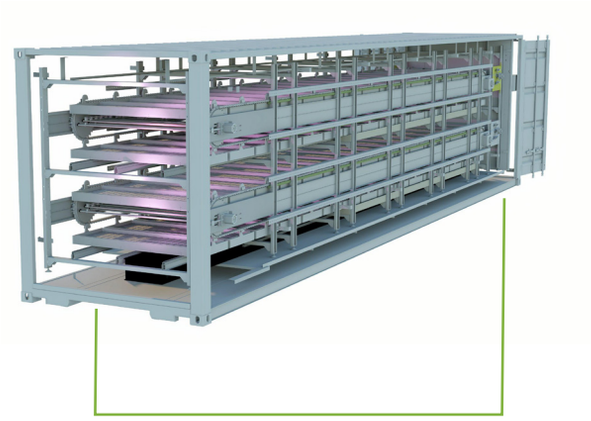


ModuleX Plant Factory

Scalable and modular plant factory set-up

The ModuleX is smart engineered with commercial needs and success in mind. You can therefore start up with a single module and grow up to a Module-64 (and beyond). As you develop new routes into the market, and attract more customers, you can continue adding grow modules and scale up your production to meet demand.

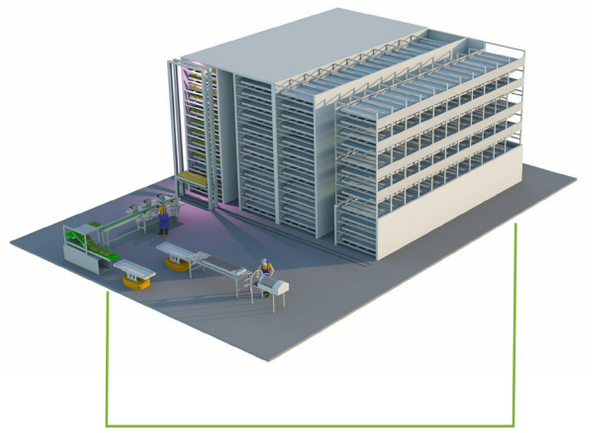
What Is the Best Solution for You?



ModuleX

Rotating bench carousel system

The ModuleX can be configured starting at one grow module, so your plant factory is scalable with the growth of your business. One grow module features 86 m^2 (926 sq. ft.) of growing surface. Each separate module has an independent climate and nutrient system, allowing your mix of crops to be adaptable to your customers' needs. We have achieved an industry-low CAPEX per growing surface. Labour costs are reduced by the automated crop-to-person 'BenchCarousel'. This is the most efficient solution to maximise your return on investment.



Large Scale Plant Factory

Tailored to any application and large volumes

The large-scale plant factory is engineered and constructed within an existing or new stand-alone building. It is a fully automated and robotised solution, with options from seeding to harvesting, and a growing surface larger than 5000 m^2 (53,800 sq. ft.). Economies of scale allow for extensive automation and labour cost savings in crop handling and processing.

Plant Factories

ModuleX: The Modular Plant Factory

Scalable

Start up small, prove your business model, scale up fast

The ModuleX is smart engineered with commercial needs and success in mind. You can therefore start up with a single module and grow up to a Module-64 (and beyond). As you develop new routes into the market, and attract more customers, you can continue adding grow modules to scale up your production to meet demand.

Adaptable

Independent climate zones & nutrient systems for maximum adaptability

Each grow module features 86 m^2 (926 sq. ft.) of growing surface. And each with an independent climate zone and nutrient system, enabling you to grow crops originating from different climates side-by-side. With a short lead time, you can add grow modules to your business as you need, and adapt to the needs of your customers and your market.

ModuleX (Box-in-Box)

The next generation ModuleX plant factory can be custom-built for and assembled on-site at your facility. The length of the carousel can be extended, as can the structure and set-up of the racks, as well as the variability of the levels. With a custom designed ‘Box-in-Box’ ModuleX, you can both increase your growth surface, and adhere to certain specifications in your given space that may render the traditional ModuleX unfitting.

Smart engineering for scalability, adaptability, and efficiency

Efficient

Automated bench handling, higher growth surface, optimal light exposure

The ModuleX is our most efficient solution. Each grow module is built into a 40 ft. container and is fitted with an automated crop-to-person bench handling system – our very own patented 'BenchCarousel'. The BenchCarousel is designed to reduce labour costs by bringing each bench to you within 90-seconds for planting, crop control, and harvesting. Each grow module is fitted with two BenchCarousels, for a total of four growing layers. Handling a single bench is the equivalent of handling four gullies (irrigation gutters) at the same time. The innovative design eliminates the need for a central corridor, thereby resulting in an increased growing surface, with higher plant density and increased yields. Each grow module contains an industry record of 86 m^2 (926 sq. ft.) of growing surface.

The rotating BenchCarousel moreover ensures that all crops have optimal and uniform exposure to LED light, by receiving 200+µmol of LED light close to the canopy (per rotation, every 90-seconds). And the individual benches allow for multiple growing combinations within the same climate zone, without disturbing one another.

You can therefore grow different herbs, leafy greens, and microgreens in the same grow module, with allocated benches. The benches can moreover be optimised for maximum plant density. For example, with Basil Genovese, we have achieved 220% higher planting density in our ModuleX system than with a gully/gutter-based system.

Research Solutions

FarmLab

The FarmLab solutions are customisable turnkey research units designed for testing all the parameters influencing plant growth. The sky is the limit when it comes to light, irrigation and data.

Rack set-up

- Choice between racks of 1300mm (overflow / drip irrigation) or 2000mm (ebb & flow / overflow / drip irrigation)

Lighting

- High light intensity: 500, 800 or 1000+ µM / m^2 depending on the desired layer height
- Variable spectrum control
- Adjustment of circadian rythm in lighting

Sensors and data

- Additional O_2 sensors
- Additional CO_2-RV-C°
- Mobile sensors with longer cable
- Manual water counter
- Data access through UCS Mission Control
- Direct data access through OPC/UA

Interior

- Waterhose reel for cleaning and watering
- Power sockets to connect additional devices
- Possibility to tap water from HVAC for analysis
- Worktables
- Airlock for food safety and hygiene
- HEPA filters
- LED work lighting in the middle aisle
- Hot water boiler
- Sinks
- Knee-operated hand washer
- Storage space
- Stainless steel furniture
- Rubber mats in the centre aisle

Irrigation

- Ebb/flow or overflow (depending on the used water tank and numbers of layers)
- Multiple irrigation channels
- Multiple nutrient dosing systems
- Variable irrigation and dosing setpoints
- Mix of irrigation pumps on the exterior of the module for easy access
- Two water drains possible (for example - osmoses and city water or rainwater)

Climate

- Additional dehumidification
- Additional humidification
- Mixing by means of a timeslot (24 timeslots) and own recipes with base / acid / A & B

Exterior

- Your logo on the sides of the module
- Flat floor or T-floor
- 20ft or 40ft high cube reefer windows
- Additional doors or exterior windows
- Extra sound alarm notification outside

Customer Journey

We carry our customers through our well-defined customer journey to lead them to greater success.

01 Educate

- Information brochure
- Crop guide
- Feasibility calculator
- Virtual tour

02 Calculate

- Business plan
- Biology trials at Urban Crop Solutions Research Centre

03 Plan

- Customised design and engineering
- Training

04 Prepare & Start up

- System construction and commissioning
- Biology and tech setup/ installation

05 Operate

- Crop growth
- Tech, biology, and data intelligence

06 Maintain

- R&D learnings
- Tech maintenance and service
- In operation support

Applications

Farm-to-Table
Belguim

A company with a mission to bring food production as close to consumption as possible. They operate locally and deliver on e-bikes to restaurants and direct consumers.

Animal Free Protein
North Carolina

A biotech company is manufacturing animal-free protein by combining biotechnology, vertical farming, and computational design. By using our patented PharmSpee™ platform, they are growing the next generation of biomolecules to serve multiple emerging industries.

AgriTech Research Centre
Singapore

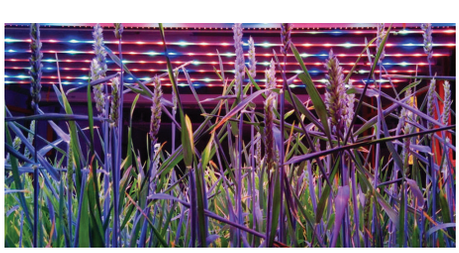
We custom designed and commissioned two indoor climate precision growth chambers at a Singapore University, for their brand-new Indoor Farming Research Centre. The Research Centre was commissioned amid the island nation's large-scale investment in controlled indoor farming.

Company Restaurant
Sweden

A ModuleX is in operation on the multinational company's parking lot in Sweden, only metres away from the store restaurant, as part of the company's efforts to become more sustainable by reducing food miles. All the produce grown in the plant factory is served in the store restaurant.

Hotel Restaurant Supplier
French Polynesia

A FarmFlex is used to produce and supply local hotels and restaurants with baby leaves and microgreens in Tahiti. While the islanders grow much of the fruits and vegetables consumed locally, most of the salad consumed on the island is otherwise flown in from Paris.



Space Exploration Missions
Belgium

Three of our custom-built FarmLabs are currently being used by a consortium to research how to grow wheat, and subsequently bake bread on Mars. The research consortium is led by a multinational bakery supplies company, for which Urban Crop Solutions is the technology partner.

Online B2C Distribution
Singapore

A local business, set-up by two young entrepreneurs operate Singapore's first fully automated container farm. They grow and supply local herbs to the high-end retail market and restaurants.

Seeds for Indoor Farming
USA

Launched by a multinational pharma-biotech & crop science company, a research facility in the USA is screening seeds for vertical farming efficacy, to increase the number of vegetables & fruits that can feasibly be grown in indoor farms in coming years.

Banana Tree Nursery
Belgium

A custom FarmLab is currently in use by a Belgian University for the growth of new banana cultivars in a controlled environment. Once they reach certain heights, they are tested for resistance to climate change, before being transported to the African highlands for repopulation.

Lettuce stay in touch!

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