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WHITEPAPER

Cultivating lettuce and herbs with automated Cultivation Systems

More efficient logistics, higher yields



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van zaal**

INSIGHT. MOVEMENT. GROWTH.

MORE EFFICIENT LOGISTICS, HIGHER YIELDS

Introduction

The global agricultural sector is facing increasingly complex challenges. Climate change, population growth, and the reduction of arable land are putting traditional cultivation methods under pressure. At the same time, the demand for more sustainable and efficient food production is growing. This calls for innovative, future-proof solutions.

One promising innovation is the cultivation of crops in automated cultivation systems. This method enables controlled, scalable, and environmentally friendly food production. Crops such as lettuce, herbs, and other leafy greens can achieve higher yields due to efficient logistics and optimized growing conditions, while using minimal amounts of water.

In this whitepaper, we explore the cultivation of lettuce and herbs using automated cultivation systems. We highlight the key features of this method, provide insights into the technologies applied, and examine real-world applications.

Central to this discussion is **the advanced Cultivation System developed by Bosman Van Zaal** – a system that excels in innovation and efficiency, supporting growers in achieving maximum yield with minimal impact on people and the environment.

Thanks to controlled environments, smart sensors, and extensive automation, plants are able to grow optimally – regardless of soil quality, seasons, or climate conditions.



Photo credits: © Soli Organic

Plants without hands

Bosman Van Zaal has developed a pioneering automated cultivation system that combines the benefits of water cultivation with advanced automation and flexible cultivation options.

This system utilizes mobile containers and innovative trays, allowing crops to be cultivated under optimal conditions and at maximum planting density throughout their entire growth cycle.

The sophisticated logistical infrastructure ensures that every stage of the cultivation process – from seeding to harvesting – runs smoothly without manual intervention. This results in increased productivity and consistent crop quality, which is essential for today's food industry.

The automated cultivation system is suitable for use in both traditional single-layer production greenhouses and vertical farms.



Photo credits: © B4hydroGrow

The Foundation for Water Cultivation

Bosman Van Zaal's automated containers provide an ideal foundation for water cultivation – ranging from fully automated, multi-layer installations to simpler, mechanically supported systems.



Our water cultivation system consists of aluminium containers with custom-designed plastic bottoms, ensuring optimal irrigation and air circulation. Automated versions make use of robust roller conveyors, while manual systems glide smoothly over pipes. This results in an efficient and stable growing environment.

Bosman Van Zaal: Efficient and Automated Cultivation with Insight

Bosman Van Zaal develops fully automated cultivation systems for greenhouse horticulture and vertical farming. From seeding to harvesting, the process is entirely automated, reducing labour costs while ensuring consistent product quality.

Innovative transport systems, climate control, and sensor-driven monitoring optimize growing conditions and adjust water and nutrient supply to meet the specific needs of the crops.

Since the introduction of movable gutter systems using Nutrient Film Technique (NFT) in the 1980s, this technology has seen continuous development. Today, Bosman Van Zaal offers one of the most advanced and reliable systems on the market: a fully automated, food-grade solution suitable for both single-layer greenhouse cultivation and multi-layer vertical farming.

With advanced climate control, robotics, and integrated management and data platforms such as ISAL and Polariks, production becomes more efficient and predictable. Automated transplanting, spacing, and harvesting systems reduce dependency on manual labor and enhance crop consistency. In addition, efficient energy management contributes to a more sustainable cultivation process. Automation and data analytics give growers full control, improving harvest predictability and enabling reliable supply agreements with retailers.

Despite a high initial investment, the low operational costs and high productivity deliver an excellent return on investment. Bosman Van Zaal thus provides a future-proof and sustainable cultivation solution that meets the growing demand for high-quality food.



Photo credits: © GrowUp

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Three types of Cultivation Systems for water-based cultivation

At Bosman Van Zaal, we offer three entry-level models, tailored to investment level and specific requirements.

Manual

- Based on containers with crop-specific bottoms for water-based cultivation on a rail pipe system.
- Often equipped with an automatic irrigation system.
- Highly suitable for further automation.

Automated systems

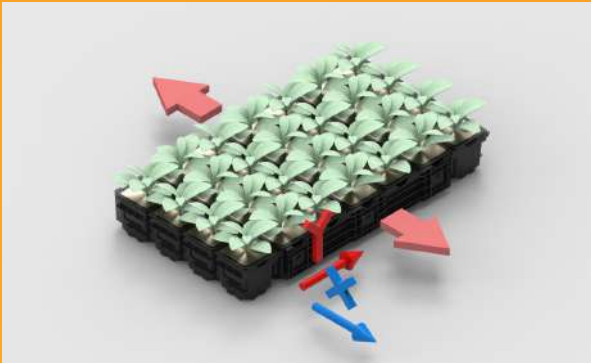
- Based on containers with crop-specific bottoms for water-based cultivation on a rail pipe system
- Equipped with an automatic irrigation system
- Full automation and robotization throughout the entire plant journey: from seeding in the germination area to processing, including robotic transplanting, spacing, and harvesting
- Tray and container disinfection and washing integrated into the process
- ISAL software for complete track & trace functionality

Automated + Full Control

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- Full automation and robotization throughout the entire plant journey: from seeding in the germination area to processing, including robotic transplanting, spacing, and harvesting
- Integrated tray and container disinfection and washing
- ISAL software for complete track & trace functionality
- Polariks: a data platform that connects systems and sensors, turning data into smart, actionable insights.

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Bosman Van Zaal Cultivation Systems: The base for integrating the TraySpacer



The TraySpacer, a patented technology used by Soli Organic, gently spaces delicate crops such as basil and lettuce without causing damage. Trays are automatically separated, ensuring uniform distribution without the need for manual handling.

These trays, placed in mobile containers, offer the key advantage of enabling crops to be grown at maximum planting density under ideal conditions throughout their entire growth cycle.



In addition to efficiency, the TraySpacer contributes to sustainability. Trays are cleaned and reused, and the removed growing medium is recycled, enabling a circular cultivation process.

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Polariks: Maximum Insight Through Data

The Polariks-platform transforms data into directly actionable insights via a user-friendly, cloud-based system. It seamlessly connects various data sources and presents them in a clear dashboard with visual analyses. Smart alerts via email or WhatsApp notify users of potential climate risks, such as low humidity levels. Polariks specialists are available to support growers with a fast and effective onboarding process.

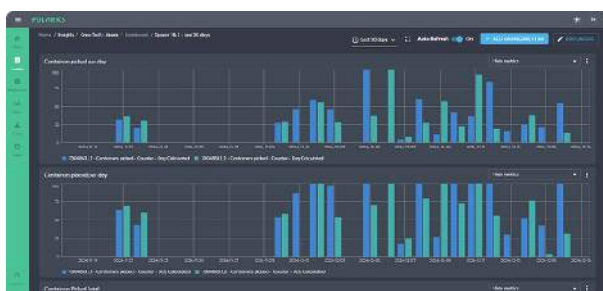
The platform is available in **two standard packages**, ensuring a suitable solution for every user's needs.

POLARIKS AGRONOMY

Real-Time Insight into Growing Conditions.

Growers often lack sufficient data to effectively manage climate, irrigation, or disease prevention. Polariks addresses this challenge with wireless sensors, intelligent analytics, and instant notifications when growing conditions fall outside desired thresholds.

This helps to reduce risks, improve crop health, and use resources more efficiently — with minimal effort.

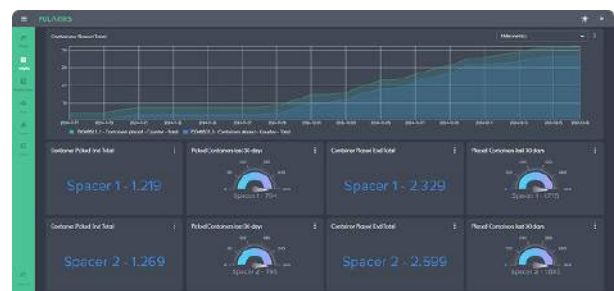


Polariks - Agronomy

POLARIKS OPERATIONS

Operational Insight

Prevent downtime and reduce costs with real-time error notifications, automated work orders, and seamless integration with machines and ERP systems. Especially during commissioning, Polariks supports early issue detection and performance optimization. Our Maintenance Management module streamlines maintenance processes through digital work orders, IoT integration, and location-based overviews — all within a single platform.



Polariks - Operations

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Practical Applications: GrowUp Farms

GrowUp Farms – High-Level Cultivation

The automated container system from Bosman Van Zaal plays a crucial role in optimizing crop production at GrowUp Farms. Thanks to innovative automation and precision technologies, growing conditions are precisely monitored and optimized, resulting in a more efficient, flexible, and sustainable cultivation process. Our systems contribute to increased productivity, improved crop quality, and the minimization of both water and energy consumption.

The new facility is fully designed for the cultivation and packaging of lettuce in retail-ready bags. It integrates all cultivation and packaging activities, supported by advanced logistics and robotics for sowing, germination, harvesting, mixing, and packaging.

Tom Ehrman, Engineering Director at GrowUp Farms, states:

"In Bosman Van Zaal, we've found a forward-thinking partner with deep horticultural expertise. Our collaboration enables us to tackle challenges and develop innovative solutions. Strategic partnerships are essential to the success of vertical farming and contribute to more resilient food systems."



Photo credits: © GrowUp

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Vision for the Future

The demand for automated and sustainable cultivation methods will only continue to grow. Container systems play a key role in this development—not only due to their efficient logistics and higher yields, but also because they enable food production closer to the end consumer.

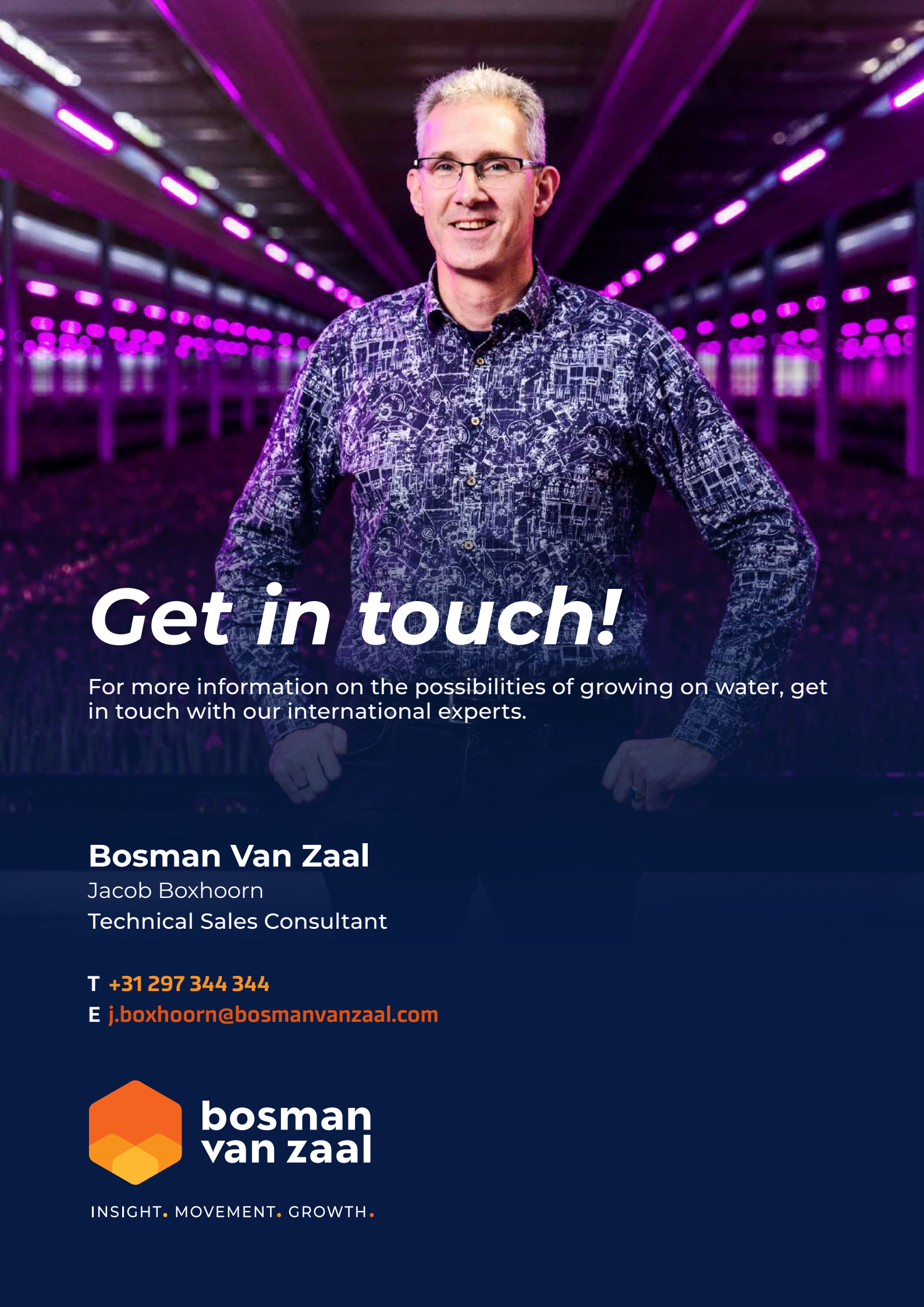
Bosman Van Zaal's automated container systems set the standard for the future of cultivation technology, providing growers with the tools and innovations needed to produce high-quality crops efficiently and at scale.

With continuous advancements in automation, vertical farming, and energy-efficient cultivation methods, container systems are becoming increasingly essential. By adopting advanced systems such as those developed by Bosman Van Zaal, growers around the world can gain a competitive edge in sustainable food production.

Moreover, this technology opens up new markets, such as large-scale vertical farming. With a strong focus on innovation, sustainability, and efficiency, automated cultivation systems are poised to play an increasingly vital role in global food supply chains.



Photo credits: © Lettus Grow



Get in touch!

For more information on the possibilities of growing on water, get in touch with our international experts.

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