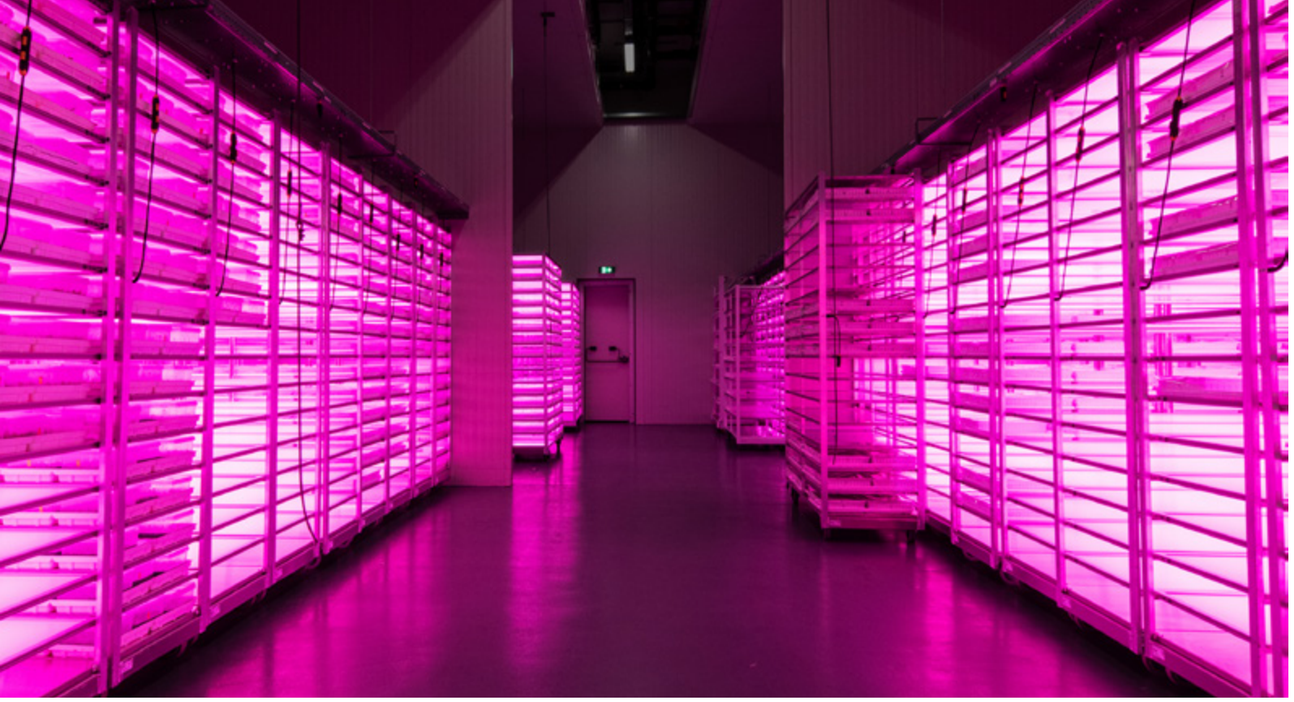
BEVER INNOVATIONS

HORTICULTURE

WE OPTIMIZE VERTICAL FARMING



MORE CONTROL OVER YOUR PLANT CULTIVATION WITH THE LEAF CARRIER

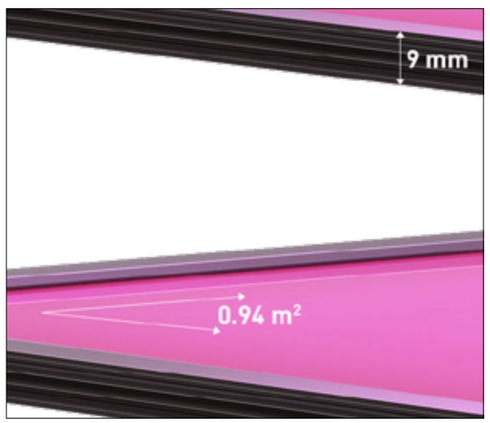
This mobile, flexible, plug-and-play cultivation trolley guarantees not only maximum yield and cultivation surface per square metre, but also minimal energy consumption per plant.

The unique, energy-efficient LED lighting in the Leaf Carrier combines the red and blue light essential for plant cultivation. Due to the fact that the light is being mixed at the source, each seedling in the plant tray is given exactly the right colour spectrum. In combination with optimum heat distribution, the Leaf Carrier ensures that your plants emerge and grow uniformly, both in the middle and at the edge of each plant tray.

The Leaf Carrier can be used for a variety of applications, such as propagation and tissue culture as well as food cultivation.

MAXIMUM CULTIVATION SURFACE PER M² FLOOR SPACE

Key feature of the Leaf Carrier is the thickness of its layers (9 mm) whilst maximizing the load-bearing capacity of the plant trays. Integrating the LEDs **into the trays** that contain the seedlings has resulted in maximum cultivation surface per square metre of cultivation chamber. Each trolley (2.27 metres in height) can easily hold up to 15 plant trays, giving you no less than **14 m² of cultivation surface in just 1 m² floor space!**



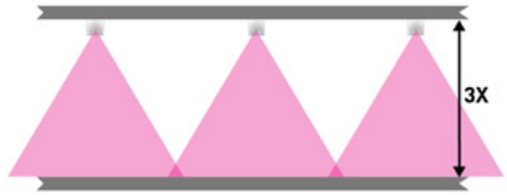
Red and blue light, for optimum plant growth

The unique, energy-efficient LED lighting in the Leaf Carrier combines the red and blue light essential for plant cultivation. Due to the fact that the light is being mixed at source, each seedling in the plant tray is given exactly the right colour spectrum, resulting in optimum, uniform growth. As no distance needs to be factored in for light mixing, all the seedlings can be positioned very close to the LEDs, without the risk of burning them.

Exceedingly uniform light, stable growth process

Correct placement of the LEDs and a clever structure to the translucent plant trays ensure uniform lighting. Both in the middle and at the edge of the plant trays, meaning you can rest assured that your seedlings will emerge uniformly and their growth will be stable. What's more, the high degree of light uniformity means that the distance between the seedlings and the plate above can be smaller than is the case with traditional systems. Enabling you to use the plant tray in its entirety.

Traditional LED lighting



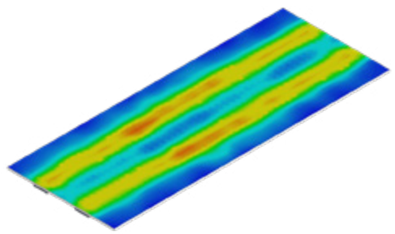
Bever Innovations Leaf Carrier

Minimum heat generation

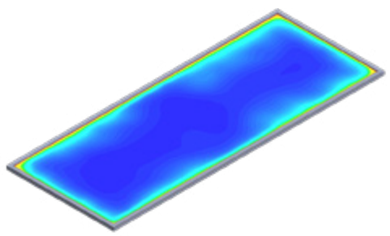
The LED lighting in the Leaf Carrier scarcely generates any heat. And placing the seedlings on an advanced plastic plant tray prevents heat generation under the plant surface and evaporation (water loss). Meaning that there is no possibility of plants being heated and/or drying out with the Leaf Carrier.

The minimal amount of heat that is generated is drawn away to the side of the Leaf Carrier in a unique, extremely efficient, natural way, resulting in an optimum, uniform climate on the plant trays. The upshot of this is uniform, stable plant growth over the entire cultivation surface, without any additional cooling being required.

Heat generation traditional LED lighting



Heat generation Bever Innovations Leaf Carrier



SCALABLE AND FLEXIBLE

With the mobile, flexible, plug-and-play Leaf Carrier no major upfront investments are required. All you need is a room with power supply! Simply start with a single 15-layer Leaf Carrier and straight away you'll have yourself 14 m² of cultivation surface! Add Leaf Carriers as as your business grows. Leaf Carriers give you optimum flexibility, as they can be moved anywhere in the room and can be put next to each other for maximum light efficiency. Various models are available, varying in height and number of layers per Leaf Carrier. There is always a suitable model available for your cultivation needs.

INTEGRATED DESIGN

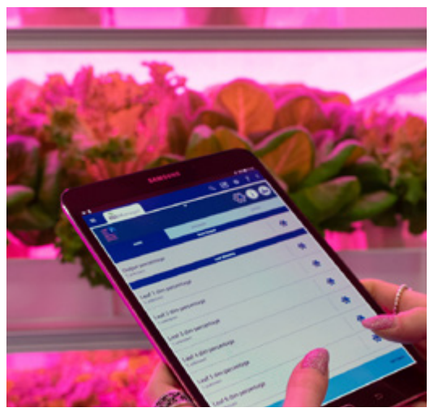
Key feature of the Leaf Carrier is its minimalistic, functional, robust and hygienic design. All cables, power supply units and intelligence have been incorporated into the frame of the cultivation trolley. Thus keeping damage to the trolley to a minimum, and preventing dirt from accumulating. Both the plant trays and the frame are easy to clean. Making the Leaf Carrier extremely well suited to being used in climate chambers and in vitro environments.

SMART TECHNOLOGY

The Leaf Carrier sheds new light on your plant cultivation. The Leaf Carrier comes with Bever Innovations Smart Technology as standard, enabling users to manage and control the light easily. An app on your smartphone or tablet not only makes it easy to switch the light on the trays on and off but also enables on and off times to be (pre-)programmed and light intensities (µmol) to be adjusted. Entirely in line with your seedlings' (cycle) needs. An optimum growth climate at minimal energy consumption is the sustainable result.

Choosing the Leaf Carrier means choosing:

- Plug-and-play installation of the cultivation trolley and app.
- Self-organizing wireless network; separate configurations not required.
- The light intensity (µmol) is easy to adjust (for each plant tray) to the growing cycle of your seedlings.
- Spread energy consumption over the day thanks to the flexible day/night switches for each trolley and for each plant tray. (optional)
- Simply switch off unused plant trays.
- Easy integration with your back office system for optimum control and insight into processes and data. (optional)



DISCOVER OUR PRODUCTS

LEAF CARRIER

This innovative, flexible, plug-and-play cultivation trolley combines the best growing conditions for your seedlings with an optimum cultivation surface and extremely energy-efficient LED lighting. Get more control over your plant cultivation and choose maximum yield per m², at minimal energy consumption per plant!

LITTLE LEAF

All the benefits of the Leaf Carrier are now also available in a compact, handy 3-layer cultivation system. The Little Leaf's diminutive stature makes it the ideal lab set-up, making testing the cultivation system for your plants simple and accessible.

CASE STUDY

John Bijl, director Vitroplus

"The uniform light output ensures a stable growth process and shortens the growing cycle with 15% and lowers energy use per plant."

Vitro Plus has been growing a wide range of ferns at its location in Burgh-Haamstede, the Netherlands, since 1990. Every year, approximately 30 million cuttings from 200 different species are grown and subsequently exported to end growers all across the world. "This allows us to manage the process as a whole", says John Bijl, Sales Director. "The process ranges from unravelling the genetic background (production) and collecting fern species to plant production, marketing and sales". Vitro Plus has been using the Leaf Carrier cultivation trolleys by Bever Innovations, Horticulture division, for several years to help guarantee a stabilised growing process, a maximum cultivation area per square metre of growth cell, along with efficient logistics.

"We use plant tissue culture, in which the plants are propagated under sterile conditions and on a laboratory scale, to cultivate our ferns", says Bijl. "Up until a decade ago, all cuttings were grown under fluorescent lighting, but with the introduction of LED lighting, we've been able to take a qualitative step forward in the cultivation process. This is because LED lighting not only has the right quantity of light and lighting properties - it also produces less heat. We only use those colours of the spectrum that are relevant for plant growth, namely red and blue. This results in significant energy savings together with firmer and larger cuttings. In addition, LED has allowed us to add a new process when it comes to producing plants, involving sowing fern spores. This makes use of the same methodology as tissue culture, but with slightly different technology. To cultivate our spore ferns, we added a totally new facility to our building, which has been fully equipped with Leaf Carriers. The LEDs have been smartly integrated into the plant trays within these mobile cultivation trolleys, which has given our production a renewed boost".

Maximum cultivation area

"LED lights are of great value for plant cultivation, but also hold a number of disadvantages", says Bijl. "A fair distance between the lights and the plant trays is required in order to ensure that all cuttings receive the same amount of light. This does not apply with the Leaf Carrier. Johan Katerberg, Business Development Manager at Bever Innovations, Horticulture Division, adds: "The Leaf Carrier distinguishes itself by minimising the thickness of its layers (9 mm) whilst maximising the load-bearing capacity of the plant trays. Integrating the LEDs into the trays that contain the seedlings has resulted in maximum cultivation surface per square metre of cultivation chamber. Up to 15 plant trays can be easily fitted into each cart measuring 2.27 metres in height. And because the red and blue light are already mixed at the source, all plants can be placed very close to the LEDs without running the risk of burning". Bijl says "With the Leaf Carrier we have twice as much cultivation surface available to us. A further advantage is that the LEDs in the trolley barely give off heat. The minimal amount of heat that does escape comes from the side and is efficiently and immediately removed. The heat does not reach the actual plants, meaning that they do not dry out".

Efficient logistics

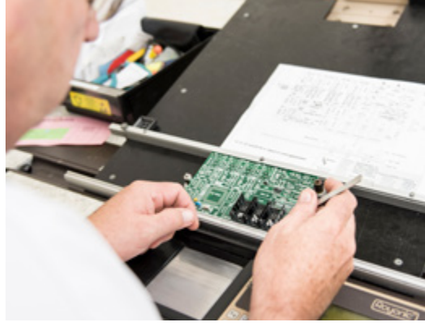
A number of logistical benefits are achieved by selecting mobile cultivation trolleys rather than fixed installations. "We are now able to place our cultivation products directly in the racking and transport them to the growth cells in our production environment. This means that no work needs to take place in the growth cell", says Bijl. "In addition, moving the cuttings to the processing/harvesting area is now much quicker and more efficient. Thanks to the cultivation trolleys we can also easily switch configurations as required by the cultivation process and/or quantities".

Custom-made solution

Vitro Plus is not only a Leaf Carrier ambassador, but has also been at the foundation of its development. Bijl says "I had been searching for some time for a solution that would enlarge my cultivation surface and configure the processes more efficiently. To do so, I looked for a mobile LED solution, but I got nowhere with the majority of LED manufacturers. They believed that working with plant trays would result in undesirable loss of light. To some extent, they were correct,

but the minimum amount of light loss is easily regained by the benefits of this solution. Bever Innovations was the only LED manufacturer that wanted to investigate the options available. They selected the right LEDs based on my requirements with regard to the light spectrum, light intensity and uniformity and worked out a customised solution. We tested the first plant tray in 2014 and two months later, I ordered the first fifty Leaf Carriers".

Vitro Plus now has 150 cultivation trolleys in operation. This number will increase over the next few months as all existing installations are replaced. "Several companies have taken an interest in the Leaf Carrier and our cultivation process over the last few years" says Bijl. "They were curious to see whether other products could be cultivated besides ferns, and I took up this challenge. I have successfully grown small vegetable plants for a number of seed production companies. I also carried out research into whether the system could be used to cultivate end products, with promising results after the same trolleys and light spectrum were used. The only difference was that the light intensity had to be increased. I have now cultivated fifty types of vegetable plants using this system, from mint and basil all the way to lettuce". He is aware that there is a major interest in cultivating food in buildings on a global level. "The Leaf Carrier can play a significant role here. I recently founded a new company to increase market familiarity, and we work closely with Bever Innovations. Own Greens offers an all-in-one solution for the retail market, in which a Little Leaf cultivator and all plants, nutrients and specs can be supplied as required. This concept will be presented at the GreenTech in Amsterdam in June including automation of the cultivation with the trolleys. This allows the products to be more easily moved into and out of the trolley. In the next 5 to 10 years, we foresee many opportunities in vertical farming of vegetables and herbs".



GROUNDBREAKING DUTCH INNOVATION

Bever Innovations is an innovator within the LED lighting industry with the best-quality Dutch LED lighting solutions. This results in groundbreaking innovations in the Horticulture market, without detracting from our social values (CSR). Our team consistently manages to get the very best out of the LED technology. We are continuously pushing back our boundaries by means of major improvements in our performance, giving us a better competitive position and increased added value for our end customers.

SOCIALLY INVOLVED

The production and assembly of our LED products takes place at two different sheltered workshops in the Dutch province of Zeeland: Orionis in Vlissingen and Dethon in Terneuzen. In addition to our 70 employees in Zierikzee, a total of nigh on 200 people are engaged in producing our LED products at the workshops each day. From design and procurement to supervising production—everything is done in-house. The result is optimum, guaranteed quality.

CUSTOMER-ORIENTED

Our focus is on situations in which the customer is centre stage. No two projects are the same, so why would our approach always be the same? Together we look for the best LED lighting solutions for your specific space and plant type, focusing on sustainability and efficiency.

NO-NONSENSE

Bever Innovations is a trusted partner in the LED lighting industry for over 20 years now. Since its inception in 1996, Bever Innovations has been manufacturing intelligent outdoor LED solutions, fully geared towards the fuel retail market (fuel stations), supplying its products to in excess of 70 countries worldwide. In addition to their uses within the fuel retail market, our LED products are extremely well suited to being used in other industries. Both indoors and outdoors.

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