

Light is Growth Horticulture lighting by OSRAM

From greenhouses to vertical farms – we deliver powerful installations for your horticulture lighting. Because light is the key to strong plant growth and high-yield harvests.

Light is OSRAM

OSRAM

Horticulture lighting: the future of growth and farming

More and more often, food production is reaching its limits. Every year, around the world, there are more people needing to be fed, but the climate is becoming increasingly unpredictable. That's why indoor farming using horticulture lighting with LED technology is clearly developing into an important solution for the future of food and nutrition.

The world's population keeps growing. Every year, 82 million more people need to be fed; by 2050, the number of people on this planet will have grown to 9.7 billion. To feed them, global food production will have to increase by up to 70%.

Urbanization leads to loss of arable land

This development can already be felt in many places today. While 680 million people did not have enough to eat in 2018, 10 million more went hungry in 2019. As the world's population grows, so do our cities. Urbanization, in turn, is leading to a loss of arable land – while world hunger is increasing. Already, a good 80% of available arable land is farmed, and 70% of freshwater supplies go to food production. To meet rising demand, farmers around the world are trying to increase production volumes even further – by using more fertilizers, more pesticides and longer transport routes. Climate change is exacerbating the dilemma. It is not only the rise in temperature that is causing problems for conventional outdoor farming – weather extremes such as droughts, hurricanes and storms are increasingly destroying harvests and worsening the world food situation.

Out of the fields and into the cities

Horticulture farming offers prospects for the future. By using hothouses, greenhouses, container farms and vertical farms, food production is shifting to where people live – regional produce instead of long, climate-damaging transport routes. Indoor cultivation makes agriculture independent of the weather and enables multiple harvests per

year. Instead of adapting plants to changing climatic conditions through genetic modification, humans can supply the proper temperature, nutrients and light according to the plant's natural needs.

LED – better than natural light

Photosynthesis is what drives plant growth. Plants need only four components for this: water, temperature, carbon dioxide – and light. Horticulture farming is also revolutionizing agriculture by optimizing the lighting situation. Natural sunlight is unevenly distributed around the world: in the north, too few hours of sunlight slow down farming, and around the equator, too much intense sunlight prevents cultivation. In greenhouses and container and vertical farms, on the other hand, UV light is continuously available via LED exposure in exactly the spectrum needed for optimum growth.

Horticulture's numerous areas of application

But it's not just about food production: flower production is also increasingly relying on indoor farming. And as "living walls," plants are increasingly found in office and residential buildings. There, they not only improve the psychological well-being of employees or residents, but also clean the air and lower the ambient temperature – a crucial factor in view of climate change. In sports stadiums, LED lighting guarantees optimal growth of the turf. And last but not least, private customers are also increasingly interested in growing lettuce and herbs in their own homes, for example.



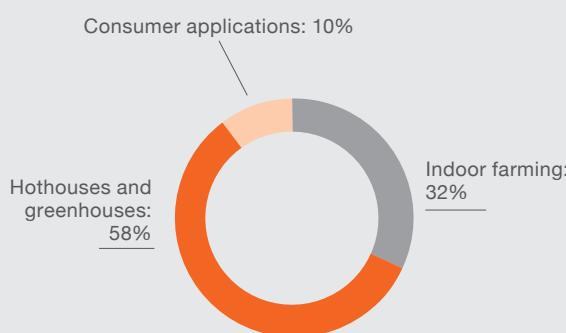


“Indoor horticulture is one of the megatrends with ever-growing importance. We at OSRAM are your perfect partner for supporting your lighting solutions to make the best grow happen!”

Nicolai Heber, Product Manager, OSRAM Digital Systems



Horticulture lighting: the market at a glance



Horticulture LED market is rapidly growing with a CAGR of ~26%

The use cases: an overview

Hothouses and greenhouses:

- Vegetables such as tomatoes, cucumbers and herbs are already grown mainly in greenhouses
- Vegetable cultivation in a greenhouse is highly efficient, economically speaking
- Primarily high-power LEDs are used

Indoor farming:

- Vertical farms enable the regional cultivation of food (currently mainly lettuce) while using very little water or space, and under controlled, stable conditions
- High-power and mid-power LEDs are generally used

Consumer applications

- End consumers grow lettuce and herbs in small indoor greenhouses
- LEDs with a high mW/\$ value are used



Horticulture lighting from OSRAM: illuminating the future with LED systems

Exactly the light that is needed – where it is needed: with revolutionary LED systems, OSRAM Digital Systems enables success in indoor farming with LED lighting components that are as efficient as they are effective, such as LED modules and LED drivers.

It used to be thought that sunlight provided exactly the spectrum that a plant needed. And that good plant lighting should copy daylight accordingly. Today we know more. For photosynthesis, for example, plants primarily need light in the spectral range from 400 to 700 nm. In horticulture lighting, the wavelengths of artificial light can be selected to enhance plant growth.

Controlling the light is the key to better growth

The light color of the LED can also be selected specifically for growth, flowering or fruiting, and propagation of specific plants. Purple-blue and hyper-red, for example, support the mechanisms of photosynthesis as the plant's energy supplier, while dark red controls germination, growth and flowering. Controlling the color spectrum, light intensity, light distribution and light spectrum as needed thus optimizes success factors such as plant growth and resilience,

as well as crop yield and food flavor. In the case of "living walls," on the other hand, the omission of specific light spectra can reduce the growth of the plants and thus the need for maintenance.

OSRAM LED products offer many advantages

For more than 100 years, OSRAM has been driving the private and industrial use of electric light worldwide. For over 30 years, OSRAM Digital Systems has developed not only a comprehensive and high-tech product portfolio, but also outstanding expertise in the development of LED systems. Compared with conventional lighting for greenhouses and hothouses, LED products (modules and drivers) and LED systems from OSRAM Digital Systems have a number of advantages.



Lighting on demand: LEDs can be distributed over the entire area of a planting operation and even directed to individual plants with pinpoint accuracy.

On/off or dimming: with LEDs, the intensity of the lighting can be regulated without changing the light temperature.

Higher yield: the customized setup and use of LED systems from OSRAM Digital Systems results in an acceleration of plant growth as well as an increase in harvest.

High ease of use: OSRAM's LED systems are easy to configure, install and use. This ensures maximum safety for the entire life cycle of the lighting installation.

Excellent compatibility: the LED drivers and LED modules in the OSRAM Digital Systems product portfolio have been developed so that they can be ideally combined with each other.

Low long-term costs: the lower maintenance requirements and long service life of LED products from OSRAM Digital Systems make them particularly economical in the long term.

Always up to date: as market insiders, we recognize trends at an early stage, analyze technological innovations and incorporate them into our products.

Guaranteed long life: OSRAM Digital Systems offers customers who purchase an LED system (module plus driver) a lifetime guarantee that is longer than the guarantee for the individual components.

Learn more about OSRAM Horticulture [here](#)



"OSRAM has a lot of experience in and huge amount of know-how about developing LED systems: modules and drivers for outdoor and indoor use, and for harsh environments. A must-have prerequisite to provide reliable solutions for horticulture products."

Matteo Toscan, Portfolio Manager,
OSRAM Digital Systems



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At a glance: the OSRAM components for effective farming

Whether standard elements or custom-made: we offer the right LED modules and LED drivers for your lighting needs.

LED Drivers

Product reference	Features	EAN	Description	Input voltage (VAC)	Max power (W)	Rated current (mA)	IP Protection
OT FIT	ON-OFF	4062172063586	OT FIT 380/220-400/1A4 D NFC HC L	220-240 / 277/347 / 400	380	1400	IP20
		4052899624436	OT FIT 500/220-400/1A6 D NFC HC B	220-240 / 347 / 400V	525	1600	IP20
		4052899624429	OT FIT 1000/220-400/1A6 D NFC HC 2CH B	220-240 / 347 / 400V	525 (per channel)	1600 (per channel)	IP20
OT P7	ON-OFF	4062172087032	OT 100/220-240/700 P7	220-240	100	700	IP67
		4062172087056	OT 150/220-240/700 P7	220-240	150	700	IP67
		4062172087070	OT 200/220-240/700 P7	220-240	200	700	IP67
OT P7	ON-OFF	4062172087094	OT 100/220-240/1050 P7	220-240	100	1050	IP67
		4062172087117	OT 150/220-240/1050 P7	220-240	150	1050	IP67
		4062172087131	OT 200/220-240/1050 P7	220-240	200	1050	IP67
OT 1DIM NFC P7	AstroDIM	4052899495012	OT 60/220-240/1A4 1DIMA P7	220-240	60	1400	IP67
		4052899495036	OT 100/220-240/1A4 1DIMA P7	220-240	100	1400	IP67
		4052899495050	OT 150/220-240/1A4 1DIMA P7	220-240	150	1400	IP67
		4052899495074	OT 200/220-240/1A4 1DIMA P7	220-240	200	1400	IP67
OT 2DIM NFC P7	AstroDIM / 1-10V	4062172060677	OT 100/220-240/1A4 2DIM P7	220-240	100	1400	IP67
		4062172060691	OT 150/220-240/1A4 2DIM P7	220-240	150	1400	IP67
		4062172069649	OT 200/220-240/1A4 2DIM P7	220-240	200	1400	IP67
		4062172069663	OT 240/220-240/1A0 2DIM P7	220-240	240	1000	IP67
OT 2DIM UNV P7	AstroDIM / 1-10V	4062172158169	OT 100 UNV 1A0 2DIM P7	100-277	100	1000	IP67
		4062172158183	OT 150 UNV 1A0 2DIM P7	100-277	150	1000	IP67
		4062172158206	OT 200 UNV 1A0 2DIM P7	100-277	200	1000	IP67
		4062172158220	OT 320 UNV 1A1 2DIM P7	100-277	320	1100	IP67
OT 2DIM P7 AUX12	AstroDIM / 1-10V / Aux 12VDC	4052899624221	OT 400/220-240/1A4 2DIM P7 AUX12	220-240	400	1400	IP67
		4052899624238	OT 600/220-240/2A1 2DIM P7 AUX12	220-240	600	2100	IP67

LED Modules

Product reference	EAN	Max. output power (W)	Rated current (mA)	PF ($\mu\text{mol/s}$)	PF efficiency ($\mu\text{mol/J}$)
Planta Seed Lite R90B10	4062172242394	23.7	700	88	3.7
Planta Seed Lite R30W70	4062172242417	30.0	700	82	2.74

Whether you are looking for the best solution for growing fresh produce or for growing flowers: with OSRAM Digital Systems, you get the best lighting design for every plant.

Benefit from our expertise – and let us advise you!

Customization is key

Every plant is different – and so is every farm. That's why OSRAM Digital Systems not only offers standard solutions, but also provides customers with exactly the light they need with customized systems.

Interview with Rauno Pokall, Development Engineer and Senior Product Manager

Mr. Pokall, the standard product portfolio from OSRAM Digital Systems is constantly growing. But what do customers do who still can't find what they're looking for?

As a company that places great value on excellent customer service, we naturally also offer key accounts the development of individual LED solutions. Experienced customers in the horticulture farming sector, in particular, know what the best application for their needs should look like. After all, they are the experts in terms of the lighting conditions on site and the requirements of their plants. That's why we also manufacture customized LED modules, or develop a suitable LED system comprising drivers and modules.

Can you describe the process using a customer example?

A hothouse owner from the Netherlands wanted to switch from traditional lighting to an LED solution, due to the higher efficiency, longer life and associated long-term cost savings of LEDs. At the same time, he wanted to continue using his existing luminaires. Our development team at OSRAM Digital Systems developed an LED system for him that guarantees pinpoint lighting according to the needs of the different types of vegetables – cucumbers, tomatoes, lettuce. The individual lighting designs now share a common basis – same luminaire, same driver, same outline – but differ in terms of the LEDs on the module. These are specifically adapted to the spectrum required by the particular vegetable to grow, blossom or bear fruit.



How long does such a customized design take?

For this special design, for example, we needed **eight months**: from the first customer meeting, through simulation with theoretical data and prototype development, to coordination of the individual components and installation on site. This **fast pace** was only possible thanks to an intensive exchange with the customer and the fact that we can centrally control all development steps in the **OSRAM Digital Systems core team**. We have the **development in-house**, the laboratories for validating the products and also the possibility of product certification for certification marks such as CE, VDE or UL. By the way, our custom products are also subject to IP protection, so our customers do not run any risk in this respect either.

Is a modification of the standard product also possible?

We offer that as well, for example with regard to the LED spectrum. One of the standard designs in our LED modules consists of red and blue LEDs. It is suitable for customers whose horticulture farms have daylight, but who want to support their plants in the growth phase with the red and blue spectrum. If a customer needs a different spectrum range, the standard module can be modified according to those needs.

**Customized products are very consulting-intensive.
What consulting service does OSRAM Digital Systems offer buyers of standard products?**

Consulting is part of our standard service. Many of our customers are newcomers or career-changers in the field of horticulture. We are happy to provide them with our expert know-how and accompany them on their journey. Intensive exchange with our customers is very important to us, as we also continuously develop our standard products on the basis of our experience in the market.

Your fast lane to success

1. Briefing with technical discussion
2. Roadmap and product idea
3. Prototyping
4. In-house development
5. System integration

} 8 months

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OSRAM GmbH

Headquarters Germany:

Marcel-Breuer-Strasse 6
80807 Munich, Germany
Phone +49 89 6213-0
Fax +49 89 6213-2020
www.osram.com

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