Horticulture lighting

OUR COMMITMENT IS TO PLANTS

LOKI lighting

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Overview

With the exponential population growth that has been recorded globally, especially since the beginning of this century; and the gradual disappearance of rural populations, resulting from natural aging and the flow of new generations to large urban centers, especially those in coastal areas, now more than ever, measures are needed to combat the scarcity of natural resources and increase production capacity in an increasingly natural and sustainable way.

The use of artificial lighting in horticultural production systems appears to be the only viable solution for achieving these objectives, reducing food production cycles, the amount of resources used, and widespread waste, while ensuring better quality and greater availability.

Plant physiology

PHOTOSYNTHESIS

Plants depend on various environmental factors for their development, namely water, soil, environmental conditions, and light.

Light is in fact the key factor, as it accounts for around 95% of the energy received by plants, mainly through the process of photosynthesis.

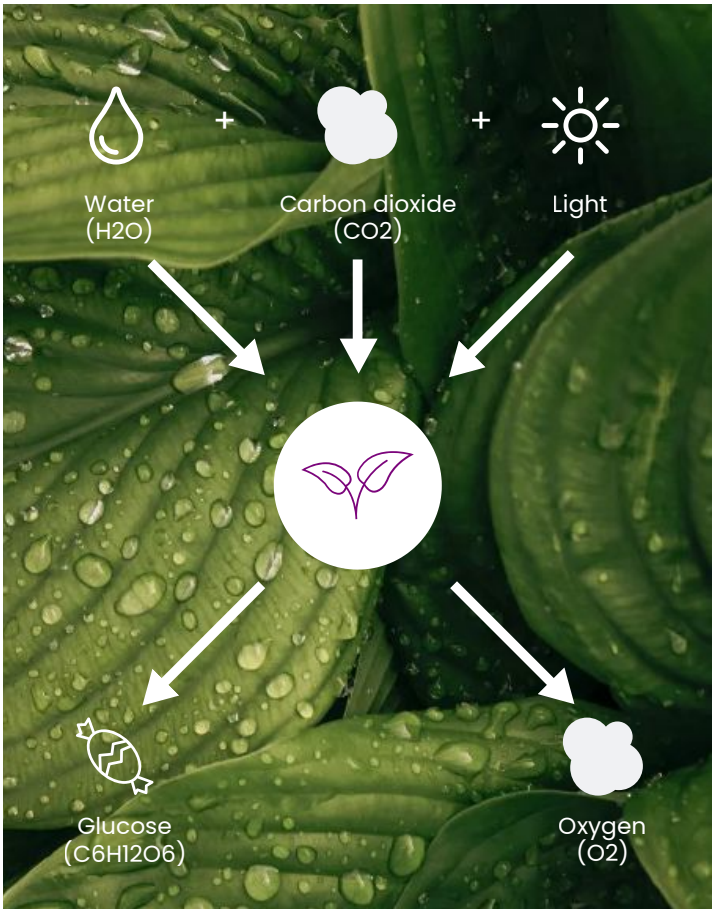
What is photosynthesis?

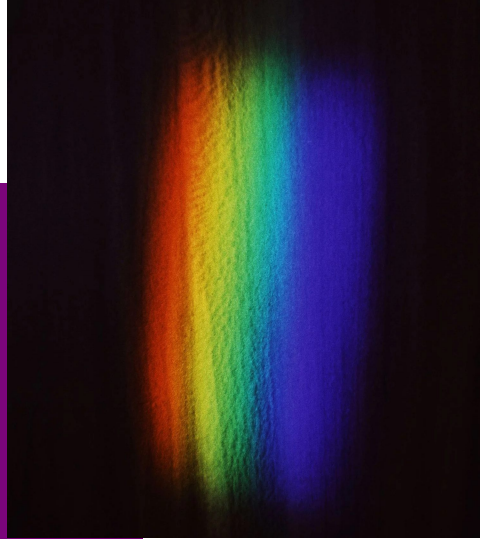
Photosynthesis is a chemical process that occurs in plants with chlorophyll and which, thanks to solar energy, enables an inorganic substrate to be transformed into an organic substrate rich in energy.

Glucose is vital for plant growth as it provides energy and building material for development, respiration, and the formation of new tissues.

Carbon dioxide is important for plants because they use it to make food through photosynthesis, helping them grow and stay healthy.

Oxygen is a byproduct of photosynthesis, released by plants as they make food from sunlight, water, and carbon dioxide. This oxygen is essential for life on Earth.





Light quality

SPECTRAL DISTRIBUTION

Light quality is important for plant growth because different colors of light affect how plants develop. Blue light supports leaf and stem growth, while red light helps with flowering and photosynthesis. Good light quality helps plants grow healthy and strong.

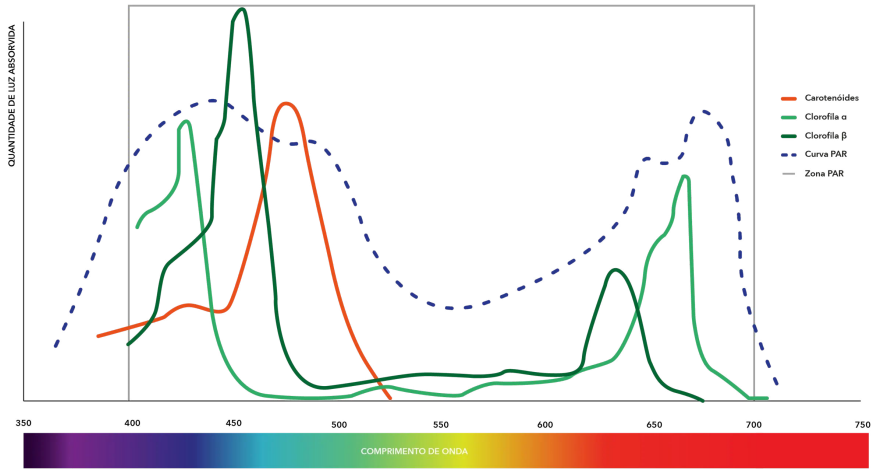
Natural absorption spectrum

Plants use sunlight for energy mainly in the visible range of 400–700 nm, called Photosynthetically Active Radiation (PAR). They do not absorb all of this light equally. Instead, they absorb light best in two regions: blue light (400–500 nm) and red light (600–700 nm). These wavelengths match the absorption peaks of chlorophyll a and chlorophyll b and are most important for photosynthesis.

Clorophil α
430-660 nm

Carotenoids
470 nm

Clorophil β
450-640 nm



Spectral efficiency

Plants can absorb some light in the 500–600 nm range using pigments like carotenoids, but this light is used less efficiently than light absorbed by chlorophyll. Also, not all absorbed light is used to make sugars—some wavelengths help control plant growth and other processes. Because of this, plants need a well-balanced light spectrum that matches their type, growth stage, and purpose. Light quality is best when the spectrum closely fits what plants naturally absorb.

Light quantity

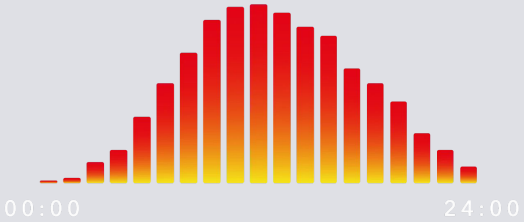
SPECTRAL POWER

Light quantity is important for plant growth because it provides the energy needed for photosynthesis. With enough light, plants can produce food and grow strong and healthy. Too little light reduces energy production and slows growth.

The key factors fundamental for plant growth are the DLI, the photoperiod and the circadian rhythm.

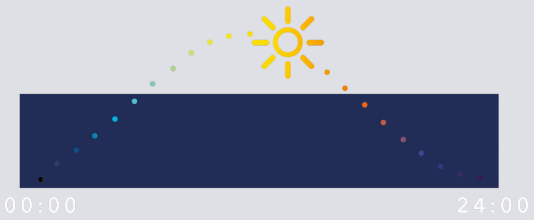
Daily Light Integral

All plants need to receive a certain amount of light every day in order to grow. This amount varies depending on the type of plant and is quantified by the DLI, measured in mol/m2/day.



Photoperiod

Photoperiod is the number of hours of light a plant receives each day. It helps plants control how much energy they take in and plays an important role in regulating growth and flowering.



Circadian rhythm

The circadian rhythm is the plant's internal 24-hour biological clock. It controls the timing of many processes in the plant, especially photosynthesis.

Energy supply

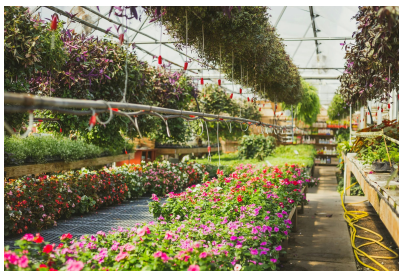
ARTIFICIAL LIGHTING

The availability of solar radiation is essential for the growth and development of horticultural crops. Artificial lighting makes it possible to overcome natural limitations in light availability that can strongly affect crop performance and profitability, while ensuring optimal growing conditions under all circumstances.

Artificial light can be used to supplement natural sunlight, fully replace it when natural light is insufficient or absent, and to control the photoperiod, allowing precise regulation of plant growth and development.

Supplementary lighting

Complementing natural light, it increases the amount of energy available, promoting plant growth. This is the typical situation found in greenhouses



Integral lighting

It allows the supply of the energy necessary for plant growth in a completely artificial way, in the complete absence of sunlight.

Photoperiodic lighting

Total control of light periods and, consequently, plant growth cycles.

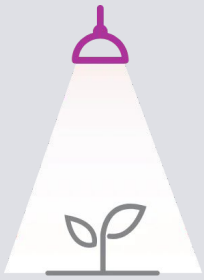
Energy delivery

SYSTEM INSTALLATION

In horticultural lighting, different installation types are used depending on the crop, growing system, and production goals.

Top lighting

Is the most traditional approach, with luminaires installed above the crop canopy to supplement or replace sunlight. It provides uniform illumination and is widely used in greenhouses and indoor growing facilities.

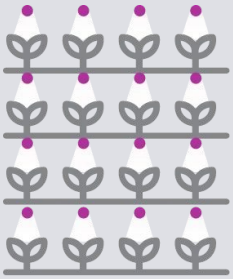


Intra-lighting

This method places lights inside the plant canopy, between rows or layers of plants. It helps light reach lower leaves, improving photosynthesis and increasing yield, especially in tall or dense crops like tomatoes and cucumbers.

Vertical lighting

This method uses stacked growing layers with lights placed close to each level. It saves space and allows precise control of light strength and color, making it ideal for urban farming and growing leafy greens.



Growing stages

FROM SEED TO FLOWERING

Plants go through several distinct growing stages, each with specific needs.

Germination

Begins when the seed absorbs water and starts to sprout, requiring moisture and warmth.

Seedling

where the young plant develops its first leaves and needs gentle light and stable conditions

Vegetative

during which the plant focuses on growing stems and leaves. Adequate light, nutrients, and space are essential at this point to support healthy structure and strong growth.

Flowering

When energy is directed toward producing flowers (and eventually fruits or seeds). Light quality and duration during this stage play a key role in determining yield and quality.

Market needs

OUR STRATEGY

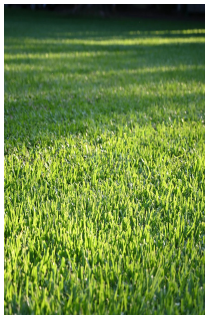
Aware of the market in which it operates, LOKI Lighting seeks to plan, design, and provide solutions that fit and suit your real needs.

For growers seeking to meet plant energy requirements, maximize growth efficiency, and achieve consistent year-round production independent of natural environmental conditions, horticultural lighting is the ideal solution.

LOKI Lighting delivers a rapid return on investment for small, medium, and large production units. In addition, the company provides comprehensive technological support and works closely with leading research centers, continuously enhancing its products and services through innovation and scientific research.

Market segments

With a deep understanding of the technical requirements and specific characteristics of each type of cultivation—and recognizing the increasingly vital role LED technology plays in improving crop performance and business profitability—we are committed to providing expert guidance and tailoring our studies and equipment to the specific needs of each project.



These are the key markets we focus on.

- Horticulture
- Floriculture
- Medical cannabis
- Natural turf

Lighting solutions

WHAT WE PROPOSE

LED lighting is important in horticulture because it provides efficient, precise light suited to plant needs. By adjusting light color and intensity, LEDs increase crop yield and quality, support year-round growing, and reduce energy use and heat.

Our LED solutions help modern horticulture by giving plants the exact light they need to grow well. They provide the right light for every growth stage, from germination to flowering, leading to healthier plants, faster growth, and higher yields.

They are energy efficient and produce little heat, which lowers power use and supports sustainable growing. Overall, our LEDs help growers get better results while reducing environmental impact.

Lighting systems

LOKI Lighting has developed a high-performance LED range designed to meet the needs of all major market segments, plant types, and installation conditions.

PROGROW T2

Management systems

LOKI Lighting gives customers full control over their LED systems with an easy-to-use management solution. After installation and testing, customers receive full training so they can operate the system on their own. LOKI Lighting also provides ongoing technical support whenever needed.

Our Methodology

CUSTOM-DESIGNED SOLUTIONS

LOKI Lighting always works closely with its customers to identify their needs and find appropriate solutions that meet their expectations.

Once the project requirements have been identified and the necessary technical and regulatory frameworks have been established, the respective specifications are generated and duly validated by the client. These will serve as the basis for the technical and economic study of the proposed solution and, once approved, for its development and implementation. This entire process is carried out in close consultation with the client.

Methodology architecture

1. Needs assessment

Identification of project needs and requirements, in accordance with the client's wishes or the project's objectives/purposes.

2. Regulatory framework

Search for appropriate solutions that meet the identified needs and comply with technical and regulatory requirements.

3. Drawing specifications

The document provides guidelines, references, and technical details for each proposed piece of equipment. It also explains current requirements and compliance, as well as the expected results of the project.

4. Defining the solution

A study of the equipment and solution that will form part of the proposal to meet the client's needs based on the characteristics of the proposed project.

5. Approval of the solution

Analysis and rectification/approval by the client of the technical proposal submitted, with the subsequent preparation of the respective economic proposal and study.

6. Project implementation

Production and installation of the equipment specified in the approved solution. Commissioning the system and carrying out all the lighting tests and adjustments required to complete the work.

Our commitment

PLANT-CENTRIC CONCEPT

Light plays a central role in the development of plants, covering almost all of their physiological and morphological needs. Our main objective is to ensure the lighting conditions that are appropriate for their growth and according to their type, always focusing on quality, sustainability and, of course, profitability.

Plants are at the heart of our entire research and development process in this area.

Cost reduction

LED lighting has a number of advantages over traditional lighting technologies. It consumes less energy due to much higher energy and spectral efficiency levels, produces less heat, reducing the thermal load on the system, and has a much longer service life.

Increase the production cycles number

Whether used as a supplement or as the sole source of light, artificial lighting can ensure the conditions necessary for healthy plant growth throughout the year and increase the number of production cycles compared to what is normal under natural lighting conditions.

Production efficiency

Light strength and color greatly affect plant growth. Light can be adjusted based on the plant type and production goals. These conditions also impact product quality, including nutrients and shelf life.

Environmental impact

LED lighting has a number of advantages over traditional lighting technologies. It consumes less energy due to much higher energy and spectral efficiency levels, produces less heat, reducing the thermal load on the system, and has a much longer service life.

R&D

BEYOND LIGHTING

Innovation is the guiding principle for any challenge we face, based on environmental sustainability and social responsibility.

Research and development (R&D) improves lighting systems by driving innovation, efficiency, and sustainability. It enables energy-saving, reliable solutions and supports smarter lighting for areas like horticulture, healthcare, and industry, ensuring better solutions for the future.

In-house and third-parties collaboration

In addition to our in-house R&D capabilities, we actively collaborate with trusted third-party partners—including research institutions, technology providers, and industry experts—to strengthen innovation and broaden the reach and performance of our lighting solutions.

R&D projects

INOVOlive

The INOVOlive project focuses on developing LED lighting solutions for table olive production. It aims to speed up fermentation, reduce salt content in brine-packaged olives, and study ways to add value to the brine.

T-LAMP

Strengthen research and innovation to improve artificial lighting efficiency while ensuring optimal growth of natural turf in soccer stadiums for high-level competition.

About us

INNOVATION IN LED LIGHTING

Founded in February 2014 and headquartered in Águeda, Portugal, LOKI is a technological innovation company dedicated to the research, design, development, and production of high-performance lighting systems based on state-of-the-art LED technology. Operating exclusively in the professional market, we cover a wide range of application areas, always adhering to the highest standards of quality and technical requirements.

LOKI has a professional and multidisciplinary team with over twenty years of experience in the lighting industry, and specifically in LED technology. This accumulated experience allows us to develop solutions focused on people's well-being, environmental sustainability, and business.

For more information, please contact us:

info@loki-lighting.com
+351 234 092 322
www.loki-lighting.com

LOKI - UNIPESSOAL, LDA

Rua João Batista, No. 12 (EN230), 3750-753 Travassô,
Águeda, Portugal

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