



Medical Cannabis

HIGH-QUALITY CULTIVATION





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Overview

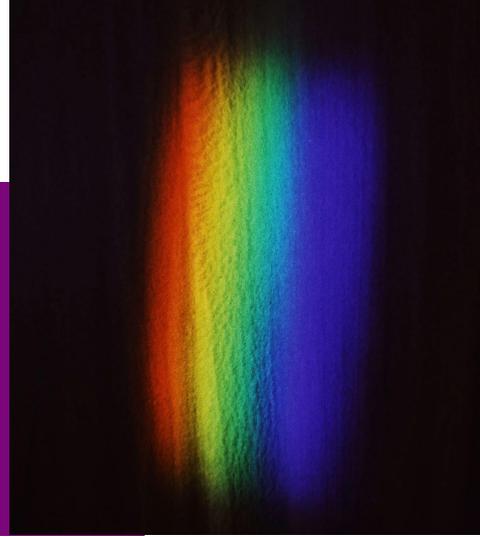
The global demand for medical cannabis products continues to rise rapidly, driven by expanding clinical applications, aging populations, and broader regulatory acceptance across many regions. Patients increasingly rely on consistent, high-quality cannabis-based therapies to manage chronic pain, neurological disorders, inflammation, and other medical conditions, placing greater pressure on producers to deliver safe, reliable, and scalable supply.

In the medical cannabis sector, where consistency, quality, and year-round availability are essential, controlled-environment agriculture has become a necessity rather than an option. The use of artificial lighting in indoor and hybrid cultivation systems enables producers to significantly reduce cultivation cycles, optimize resource efficiency, and limit waste, all while ensuring standardized, pharmaceutical-grade cannabis production. As demand for medical cannabis continues to grow, advanced lighting technologies offer a sustainable and scalable solution to meet regulatory, environmental, and patient needs.



Light quality

SPECTRAL REQUIREMENTS



Light quality plays a critical role in the growth and development of medical cannabis plants, as different wavelengths directly influence physiological and morphological responses.

Blue light promotes strong vegetative growth by supporting leaf expansion and stem development, while red light is essential for efficient photosynthesis and the induction of flowering. Optimizing light spectrum ensures healthy plant structure, consistent cannabinoid production, and overall crop quality.

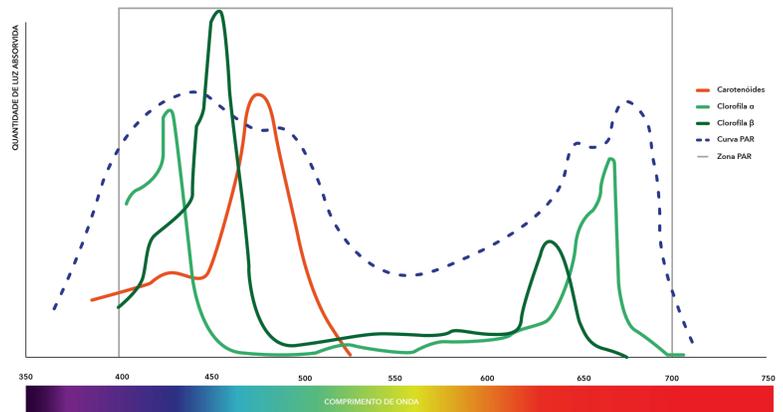
Plants absorption spectrum

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.

Chlorophyll α
430–660 nm

Carotenoids
470 nm

Chlorophyll β
450–640 nm



Spectral needs

While the spectral requirements of medical cannabis plants are fundamentally driven by photosynthesis, their optimal light needs vary depending on the growth stage and plant species. Different cannabis species and genotypes exhibit distinct physiological responses to light spectra, meaning that vegetative development and flowering benefit from different wavelength ratios depending on genetic background. As a result, stage- and species-specific spectral management is essential for maximizing plant health, yield, and consistency.

Light quantity

SPECTRAL POWER

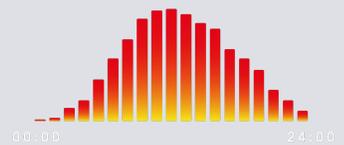


Light intensity fuels photosynthesis in medical cannabis, directly impacting growth, yield, and quality. Insufficient light limits energy production and reduces plant performance.

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

Daily Light Integral

All plants require a daily light dose to thrive, measured as the Daily Light Integral (DLI) in $\text{mol}/\text{m}^2/\text{day}$. In medical cannabis, DLI needs vary by growth stage, with vegetative and flowering phases demanding different light intensities for optimal development and yield.



Photoperiod

In medical cannabis, photoperiod—the number of light hours a plant receives each day—is a key factor in controlling energy intake and regulating growth. Adjusting the photoperiod and light schedules (LS) according to the growth stage is essential for managing the transition from vegetative growth to flowering, ensuring optimal development, yield, and cannabinoid production.



Circadian rhythm

In medical cannabis, the circadian rhythm—the plant's internal 24-hour biological clock—regulates key processes, particularly photosynthesis. Its effects are growth-stage dependent, with light scheduling during the vegetative and flowering phases influencing energy use, development, and overall plant performance.



Energy supply

ARTIFICIAL LIGHTING



Adequate light is essential for medical cannabis growth and yield. Artificial lighting overcomes natural sunlight limitations, providing consistent, optimal conditions to maximize plant performance and quality year-round.

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.





Energy output

SYSTEM INSTALLATION

In medical cannabis lighting, two installation configurations are typically used, depending on the crop, growing system, and production goals.

Top lighting

This traditional lighting approach involves installing luminaires above the cannabis canopy to supplement or replace sunlight.

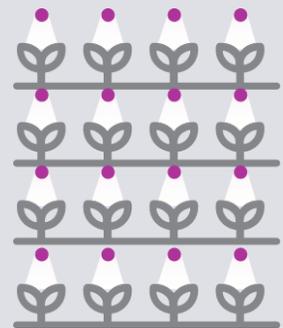
It provides uniform illumination and is widely used in greenhouses and indoor cultivation, supporting consistent growth, development, and cannabinoid production throughout vegetative and flowering stages.



Vertical lighting

This method uses stacked growing layers with lights positioned close to each canopy level.

It maximizes space efficiency and allows precise control of light intensity and spectrum, making it ideal for indoor cannabis cultivation, particularly in vegetative and flowering stages where uniform light exposure is critical for consistent growth and cannabinoid production.



Cultivation process

FROM TISSUE TO FLOWERING



Medical cannabis plants go through several distinct growing stages, each with specific needs.

Stock plants (mothers)

A healthy, mature female cannabis plant kept specifically for cloning purposes. These plants are never harvested for flowers themselves but are maintained in a vegetative state to produce cuttings (clones) that will grow into genetically identical plants for medical production.

Tissue culture

Tissue culture is a way to grow new plants from tiny pieces of a plant in a clean, nutrient-rich environment. It's also called micropropagation and is used in medical cannabis to make many healthy, identical, and disease-free plants.

Cloning

In cannabis cultivation, this means taking a cutting (a small branch or leaf tip) from a healthy plant (often a mother plant) and growing it so it develops roots and becomes a full plant with the same traits as the original.

Vegetative

The growth phase of the plant when it focuses on developing leaves, stems, and roots rather than flowers (buds).

Pre-flowering

The transitional phase between the vegetative stage and the flowering stage, and it's critical for identifying the plant's sex and preparing it for optimal bud production.

Flowering

The stage when the cannabis plant stops growing leaves and stems and starts making buds. These buds contain cannabinoids like THC and CBD. The plant focuses its energy on reproduction, and this stage determines the quality and amount of the harvest.

Lighting requirements



DIFFERENT LIGHT NEEDS

Medical cannabis needs the right amount, type, and schedule of light to grow well.

Medical cannabis growth depends on light, water, nutrients, temperature, humidity, and airflow. Light is the most important, driving growth and bud development. Our lighting recommendations for all the growth stages are as follows.

Photon flux requirements

GROWTH STAGES				
STAGE	DURATION	PHOTOPERIOD (HOURS)	INTENSITY UMOL/M2/S	FOCUS
Propagation	14 days	18	150–200	Leaf development, strong stem formation
Vegetative	21+ days	18	200–500	Rapid growth, canopy building
Pre-Flowering	3–7 days	12	500–800	Transition from vegetative to flowering
Flowering	8–10 weeks	12	700–900	Bud development, cannabinoid production

STOCK PLANTS (MOTHERS)				
GROWTH	DURATION	PHOTOPERIOD (HOURS)	INTENSITY UMOL/M2/S	FOCUS
Slow	-	18	350–450	Genetically stable source of cuttings
Fast	-	18	500–600	

Spectral requirements

Spectral requirements vary by species and growth stage: blue light supports vegetative growth, while red light and a 12/12 photoperiod induce flowering. Proper environmental management ensures healthy plants and high-quality buds.



Lighting solutions

WHAT WE PROPOSE

LED lighting is important for medical cannabis because it gives precise light for growth, boosts bud yield and cannabinoid content, and allows year-round cultivation with less energy and heat.

Our LED solutions support medical cannabis cultivation by providing plants with the precise light they need at every stage, from tissue culture to flowering. This promotes healthier plants, faster growth, and larger, more potent buds.

LEDs are energy-efficient and produce little heat, reducing power use and supporting sustainable growing. Overall, our lighting helps growers achieve higher-quality yields while minimizing environmental impact.

Lighting systems

LOKI Lighting provides high-performance LED solutions tailored for medical cannabis cultivation. Our lights feature both fixed and adjustable spectra, along with customizable intensity, to support every growth stage—from tissue culture to flowering—ensuring healthy plants, larger yields, and enhanced cannabinoid content. Energy-efficient and low-heat, LOKI LED solutions help growers optimize results while reducing energy consumption and promoting sustainable cultivation.



PROGROW T2

Management systems

LOKI Lighting gives medical cannabis growers full control over their LED systems through an intuitive management solution. After installation and testing, growers receive comprehensive training to operate the system confidently. LOKI Lighting also offers ongoing technical support to ensure optimal performance at every stage of cannabis cultivation.



Our commitment

PREMIUM CULTIVATION



Light plays a central role in the development of medical cannabis plants, influencing nearly all physiological and morphological processes. Our primary objective is to provide optimized lighting conditions tailored to each growth stage and cultivar, ensuring consistent quality, sustainability, and long-term economic viability.

Our commitment is to plants—specifically, to the cultivation of high-quality medical cannabis and the development of premium medical products.

Consistent Quality and Safety

Ensure uniform cannabinoid and terpene profiles, absence of contaminants (pesticides, heavy metals, microbes), and full compliance with medical and pharmaceutical standards (e.g., GMP/GACP).



Regulatory Compliance and Traceability

Maintain complete traceability from genetics to finished product, meeting all local and international regulatory requirements, documentation, and audit standards.



Optimized Yield and Efficiency

Achieve stable and predictable yields through optimized cultivation practices, controlled environments, and efficient use of resources (light, water, nutrients, energy).



Sustainability and Cost Control

Minimize environmental impact while maintaining economic viability, through energy-efficient systems, responsible water use, waste reduction, and scalable production models.



About us

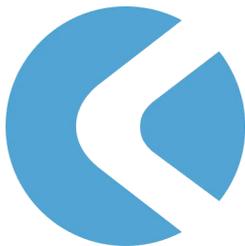
INNOVATION IN LED LIGHTING



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.

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