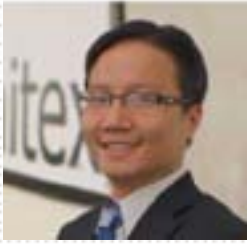


Illumitex Advantages in Cannabis Cultivation



Dung Duong

Technology

Since inception, Illumitex has invested more than \$45 million into the development and commercialization of our innovative LED technology. An expert in the field of optics, company founder and Chief Technology Officer Dung Duong based the design of Illumitex LED optics on basic physics principles, which ensure that the vast majority of the photons being emitted from the LEDs are captured and delivered directly to the cannabis canopy. As a result, the highest level of efficiency and light intensity is achieved in a proprietary and patented LED package. A vertically integrated company, Illumitex manufactures its LED packages in Penang, Malaysia (including robotic die placement, gold wire bonding, phosphor application and optic assembly) and assembles fixtures in Austin, TX.



Paul Gray

Horticulture science expertise

Illumitex is not just another company that decided to jump on the bandwagon of the emerging legal cannabis industry. Our company was founded on the development of scientifically proven lighting solutions specifically for horticulture and we have been working with growers in Colorado since 2011. Plant scientists on staff not only ensure that Illumitex products will exceed the expectations of our customers, but also provide invaluable support and guidance. We are not interested in simply selling lighting products — our value goes much further by providing knowledge and experience in all aspects of cannabis cultivation.

Paul Gray, Illumitex Senior Plant Scientist and VP of Horticulture Lighting, holds both Bachelors' and Masters' degrees in botany and microbiology from Stephen F. Austin State University, where his graduate research emphasized the use of controlled environment techniques that allowed him to statistically quantify a plant's ability to defend against plant pathogens. This work was then used to develop plant breeding programs now in use by the U.S. Department of Agriculture and the Natural Resource Conservation Service. Paul's botanical and controlled environment agriculture expertise merges with his lighting engineering knowledge to assist in developing the right lighting solutions for Illumitex clients.

Product engineering & construction

Illumitex's talented and knowledgeable team of engineers thrives on producing horticulture fixtures that combine aesthetic style with functionality, outstanding performance and long-lasting durability. Our slim fixture designs and IP66 ingress protection ratings against intrusion of water and dust make it possible for experienced growers to stack grow levels vertically, thus maximizing production. Unlike some fixture manufacturers, each fixture produced by Illumitex is ETL and cETL listed per UL safety standards. Additionally, every

Illumitex, Inc. ■ 6301 E. Stassney Lane, Building 6, Suite 400 ■ Austin, TX 78744 ■ 512-279-5020 ■ www.illumitex.com

Throughout their website Illumitex is very clear about their claims. This comparison report is very vague in that they do not indicate what fixtures were used and little comparative data is given. They do not give us the wattages, the harvest times, the yields or journals which would have given detailed crop production values from propagation through final harvest. They provide us with no images of the HID garden. While it does show a lab analysis for the resulting crop under each lighting type there really is not any other information to make an informed conclusion. The way this information has been presented here we are left to having to trust the manufacturers analysis. This is not the way to conduct a true side-by-side comparison making this report irrelevant.

Cannibus Cultivation: The Best Solution for Your Needs

single fixture shipped from Illumitex is powered up for a “burn-in” period prior to packing and shipping to ensure the highest level of quality.

Services

As an additional benefit to our customers and potential customers, Illumitex will create detailed, modeled lighting layouts for your operation’s particular grow space geometry indicating recommended fixture placement as well as expected PPF and uniformity values. Our goal is simply to provide the best lighting solution possible for your specific horticulture needs and budget.

Light and spectral uniformity

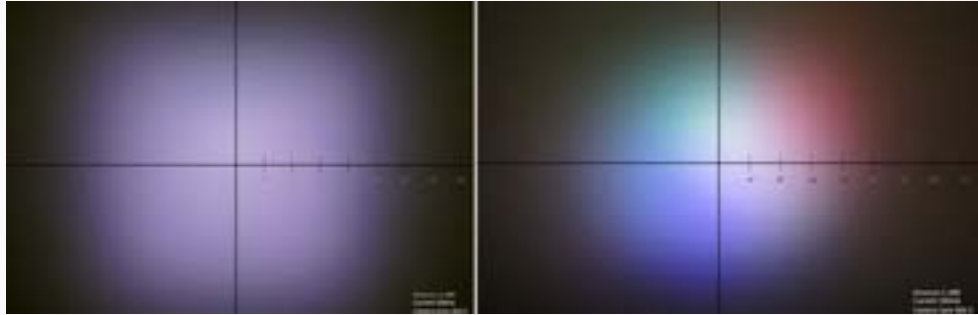
The result of our optical innovation is perfect uniformity of light intensity and color delivered to the entire cannabis plant canopy. This means there is no plant damaging “hot spot” over the center of your grow that trails off to a much lower light intensity at the perimeter as is common with other technologies and manufacturers. Our even uniformity ensures consistent growth and yield for all of the plants within your grow space, not just those near the center.



Left, even uniformity of light intensity from illumitex over 4x4 grow area. Right, uneven light levels and hot spot from HID and induction lighting over 4x4 grow.

Since Illumitex’s technology allows the combination of 16 LED chips of different wavelengths within a single ½”-square package, perfect color blending is achieved directly beneath the emitting surface of the fixture. Other LED fixture manufacturers are forced to alternate LEDs with different wavelengths along the fixture emitting surface - sometimes as much as three inches apart. This design restriction results in uneven color uniformity on the plant canopy and therefore, uneven plant growth and yields.

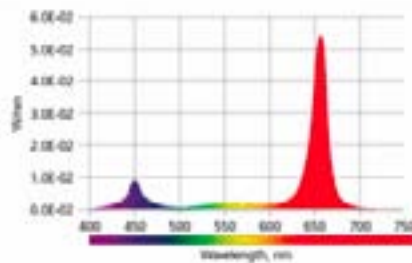
Cannabis Cultivation: Ideal combination of wavelengths



Left, perfect color blending from Illumitex Surexi™ LED technology. Right, uneven color blending from other LED fixture manufacturers.

Single spectrum for veg and bloom

The workhorse and most popular spectrum from Illumitex, F3 produces the best vegetative and flowering results among all of the Surexi™ spectra options. Each Illumitex Surexi™ F3 LED package provides an ideal combination of wavelengths from the blue and red PAR spectral range scientifically designed to facilitate superior vegetative through flowering growth. The F3 spectrum also includes a small amount of green which is especially beneficial for the quality assessment of plants. With Illumitex's F3 spectrum, there is no need to change fixtures and lamps or relocate delicate plants from one room to another during the growth cycle. Simply reduce the daily light integral (DLI) to facilitate the flowering response. The F3 spectrum is recommended for use in controlled environment agriculture operations of any size.



F3 wavelength distribution

Blue (400-499nm)	11.0%
Green (500-599nm)	7.7%
Red (600-699nm)	81.0%
Far Red (700-780nm)	0.3%

Low energy consumption and heat generation

Requiring less than half the energy of incumbent technologies such as high pressure sodium (HPS) or metal halide (MH), LED fixtures from Illumitex can be a significant factor in reducing the overhead of a large grow operation. In addition to the fixture energy savings, Illumitex products generate less than

Cannabis Cultivation: 15 years of high quality lighting

half the heat as these older technologies meaning one-half of the energy cost required to remove the heat generated by means of HVAC, fans or chillers. In a new operation, a substantial savings in capital expense can be realized due the reduction in HVAC equipment requirements. Extremely low forward heat generation also means there is no potential for harming plants as a result of having the fixture too close to the canopy.

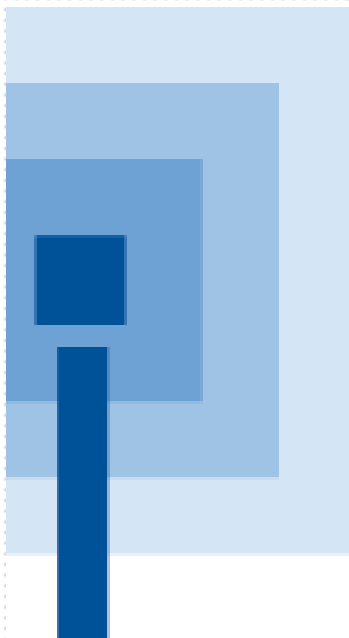
- Half the electrical load for air conditioning/chillers
- Energy rebates available through local utilities based on >50% energy savings vs. standard 1000W HPS

Long life

Rated for 60,000 hours of operation until L70 (the point at which the intensity of light from the LED is 70% of the initial level), you can expect your Illumitex horticulture products to deliver high quality lighting to your plants for nearly 15 years and very beneficial light levels for many years afterwards with no need to ever replace or dispose of old lamps.

Results

- Independent lab tests have revealed a 19% increase in CBD and a 24% increase in THC in a side-by-side comparison between Illumitex fixtures with the F3 spectrum and high pressure sodium fixtures (see test data on following pages).
- Production increases (strain dependant) up to 15% in overall dried bud weight have been achieved
- Decrease in growth cycles times have increased annual yield by giving growers an average of one extra grow cycle.
 - For example: 82 days for HPS vs 68 days for Illumitex LED
- Overall annual yield could reach 40% when combining cycle time and harvest weights.



Independent test results for Green Crack strain grown under Illumitex F3 veg and bloom spectrum:

CannLabs TESTED		Illumitex 5307 Industrial Oaks Blvd #100 Austin, TX 78715		
Test Date 8/18/2013	Expires 8/19/2013	F3A-B Sample Type: Flower	TestID SB06.6.13-2	
Chemical Report		Physical Exam		
Cannabinoid Assay				
Assayable Cannabinoids		Active Cannabinoids		
CBD-A	0.31 %	Max CBD	Total Active Assayable Cannabinoids	
CBD	<0.01 %	0.27 %		
THC-A	27.72 %	Max THC	25.60 %	
THC	1.02 %	CBN		
CBN	<0.01 %	0.00 %		
Visual Inspection Assay				
		Yes	NO	Severity 1-10
Wet	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
Powdery/Mildew	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
Insects	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
Misc.	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
NOTES				
				
www.CannLabs.com		303.309.0305	lab@cannlabs.com	

Independent test results for Green Crack strain grown under high pressure sodium lamps:

CannLabs TESTED

illumitex
5307 Industrial Oaks Blvd
#100
Austin, TX 78755

Test Date: 6/30/2013 | Expires: 8/9/2013 | GC HPS-B | Sample Type: Flower | TestID: 5806.6.13-6

Chemical Report

Cannabinoid Assay

Assayable Cannabinoids		Active Cannabinoids		Total Active Assayable Cannabinoids
CBD-A	0.26 %	Max CBD	0.22 %	
CBD	<0.01 %	Max THC	19.21 %	
THC-A	21.35 %	CBN	0.05 %	
THC	0.47 %			
CBN	0.05 %			

Physical Exam

Visual Inspection Assay

	Yes	NO	Severity 1-10
Mold	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Powdery Mildew	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Insects	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Mix	<input type="checkbox"/>	<input checked="" type="checkbox"/>	

NOTES

GC HPS-B

www.CannLabs.com | 303.309.0105 | lab@cannlabs.com

White Paper ■ Illumitex

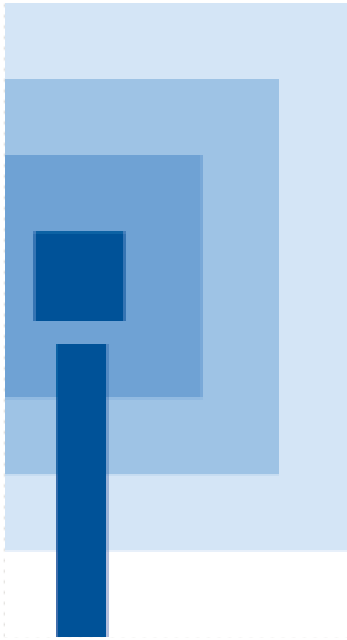
The following images show results through all stages of the cannabis growth cycle under the Illumitex F3 veg and bloom spectrum:



Healthy cannabis plants in vegetative state under Illumitex F3 veg and bloom spectrum.



Green Crack strain thriving under Illumitex F3 veg and bloom spectrum.

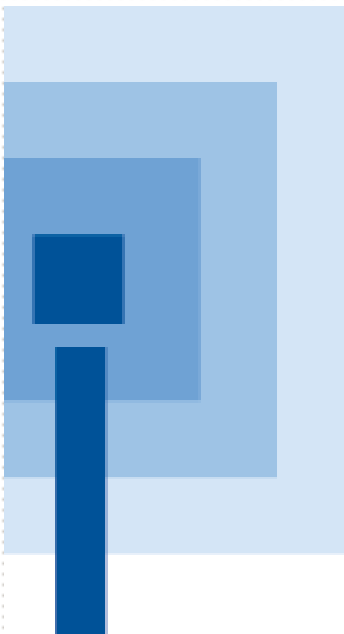




Midway into flowering under Illumitex F3 veg and bloom spectrum.



Beautiful trichome development from Illumitex F3 veg and bloom spectrum.



White Paper ■ Illumitex



A bountiful harvest produced by Illumitex F3 veg and bloom spectrum.

Testimonials

Cannabis

“These are actually the best results I have seen from strictly LED growing, ever.”

— Danny Danko,
Senior Cultivation Editor of High Times magazine

“The plants are finishing up about a week and a half quicker and the initial results were that we got about 15% better yield.”

— Michael Turcott,
Head Grower at Rocky Mountain High in Denver

Non-cannabis

“We believe that Illumitex is the premiere lighting source for indoor horticulture based on our independent testing conducted this year in New Buffalo.”

— Daniel Kluko,
Director of Research & Development at Green Spirit Farms

“HPS, metal halide, T5, induction, LED...we tested everything. We can see night and day that the Illumitex LEDs are better.”

— Dennis Riling,
VEG-E Systems Founder and CEO

Disclaimer: Illumitex does not condone the use of its horticulture lighting products for the cultivation of cannabis by anyone other than licensed growers in states and countries where the practice is legal.

JANUARY 14, 2014

LEAVE A COMMENT

Posted in: [Controlled Environment Horticultural LEDs](#), [Horticultural LED lighting](#) Started by [Gretchen Heber](#)

PPFD — A Grower's Best Friend



In your search for LED grow lights, you may have encountered the acronym "PPFD." An abbreviation for photosynthetic photon flux density, PPFD is a measure of the number of photons in the 400-700nm range of the visible light spectrum (photosynthetic active radiation or PAR) that fall on a square meter of target area per second. Why do you need to know this? Any light manufacturer can brag about the vast amount of light a fixture produces. But if that light isn't getting to the target (i.e., the plant canopy), all that light is wasted. You flip the switch on your light source and much of the generated light will hit its intended target. However, a percentage of the light photons never make it to the target due to optical losses. Lost light is lost dollars, because you're burning energy to send light photons off in directions you don't want them to go.

Illumitex LED grow lights are built with breakthrough LED optics that extract and direct photons at the die level, delivering more usable light to the intended target, with



considerably less light spillage than the lights of other manufacturers. We've created an LED package that emits light in a uniform, highly precise beam directly from the source. Many lamp manufacturers still specify the output of their fixtures (flux) in lumens, though this just specifies how humans perceive the intensity of the light. Plants "see" a much different spectrum of light than do humans, so to accurately assess grow light LEDs, one must understand the amount of plant-usable light (photosynthetic photon flux or PPF) your fixture emits, the distance from the light to your plants, and your growing area. To calculate the amount of usable light that is reaching your plant canopy you must first know the LED fixture's PPF. Then you can use a [PPFD calculator](#) — inserting your particular growing parameters — to determine how much light your plants are actually getting from your fixture. Different plant species have different PPFD requirements, so compare your results

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[Illumitex LED Lights = Happy, Tasty Lettuce at VEG-E Systems](#)