

Photon^{Max}[®]

BY MaxLite[®]



HORTICULTURAL LIGHTING SOLUTIONS

JUNE 28, 2018

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Agenda:

- Educational Tract
- Products Overview
- Applications: Lighting Layout Support
- Marketing Material
- DLC/ASABE: Rebates
- Closing Points
- Q&A



MaxLite Presents:

PhotonMax
Horticultural
Lighting Solutions

Thursday,
6/28/18 @ 1pm EST



PhotonMax products provide reliable performance that optimizes plant growth in green-houses and indoor operations of all sizes. PhotonMax horticultural solutions give the photon energy your plants need for each stage of growth - from seedlings to clones, from vegetative to flowering. Join the webinar to learn how PhotonMax products enable faster results, bigger yields and higher quality plants!





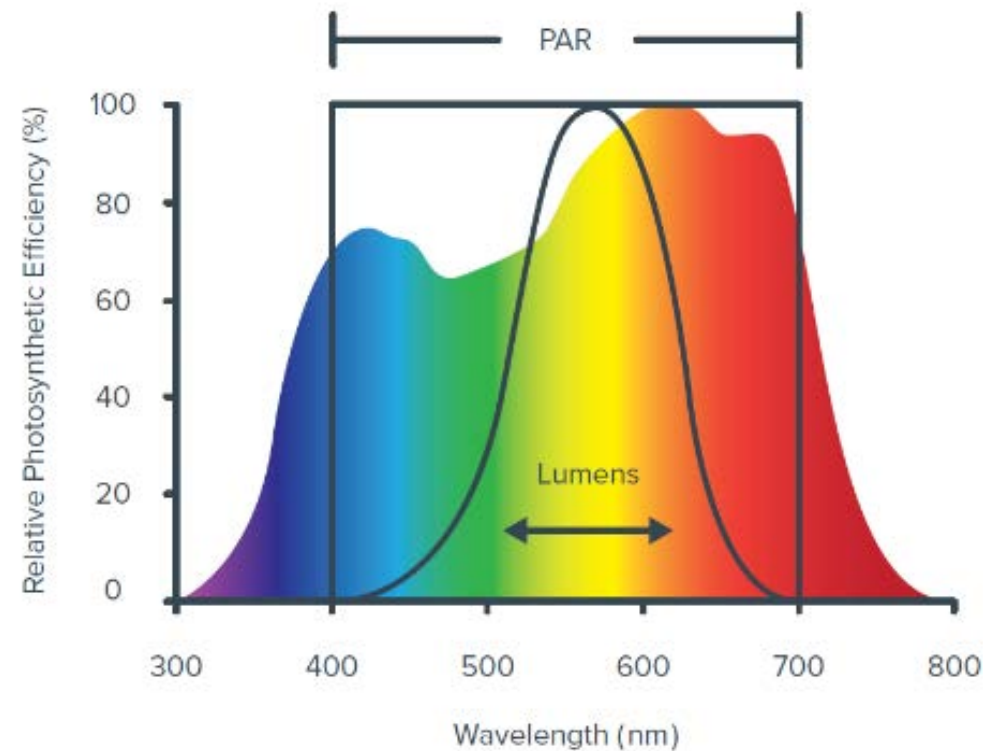
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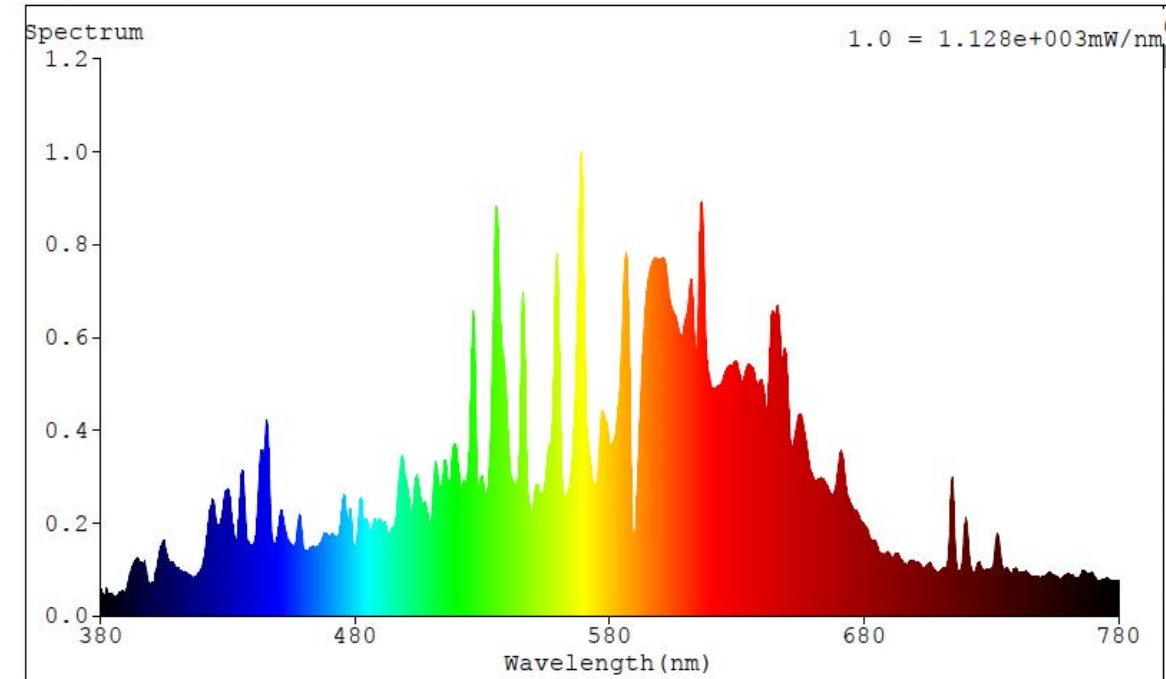
1. **Par: (Photosynthetically Active Radiation Spectrum)**
400-700nm Range of Photosynthesis
2. **PBAR:** Critical portion of spectrum outside of PAR area,
UV range below 400 nm and far-red region beyond
700 nm (280-800 nm)
3. **Photosynthetic Photon Flux (PPF)**
Rate of flow for photons in PAR Band
4. **Photosynthetic Photon Flux Density (PPFD):**
PAR photon flow rate per unit area on a surface
5. **Photoperiod:**
The description for the duration of light use, versus
off. Ex.(18 Hours on, 6 Hours off)
6. **Daily Light Integral:**
(DLI) Photosynthetic Photon flux density received
over a 24 Hour period



“Lumens are for humans!”

- **Photosynthetic Photon Efficacy:**
($\mu\text{mol}/\text{J}$) or ($\mu\text{mol}/\text{W}$) (PAR per Watt)
- **Photomorphogenesis:**
Change in morphology (shape) response's to changes in lighting spectrum -
 - More to plant quality than just photosynthetic response
- **Spectral Distribution Graph Exp:**
Image to the right
- **Stage of Growth:**
(Clones seedlings, Vegetative, Fruiting/Flowering)

Spectrum



Spectral Distribution

MaxLite - 315W CMH Lamp Spectrum shown above

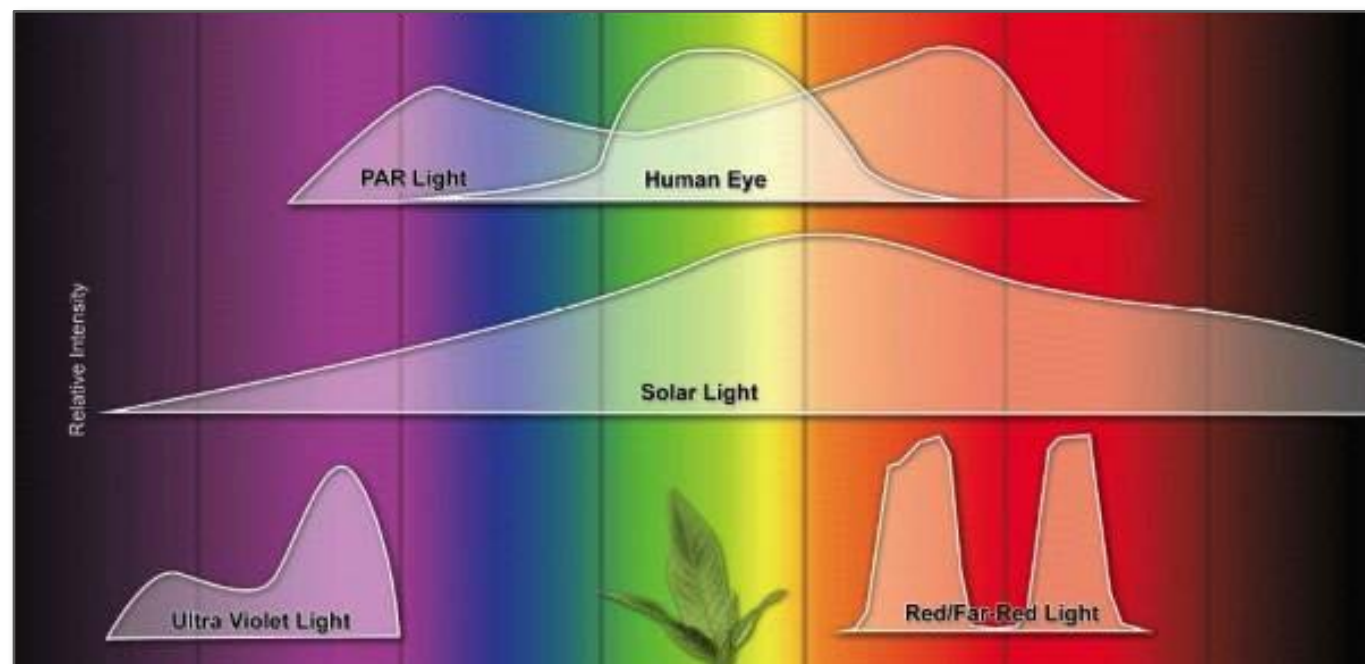
“PLANT’S DON’T SEE, THEY FEEL”

Metrics for evaluating a Horticulture lighting solution

- **PPFD** (Photosynthetic Photon Flux Density)-Total PAR received on a Surface or spot
- **Micromole Per Joule**-Efficiency per Watt or Joule
- **Fixture Form Factor**-Application-Facility-Match-Grower Specific
- **Spectral Composition**-Beyond the McCree Curve peaks
 - Photomorphogenic Responses
 - Secondary Metabolite Synthesis
 - Biomass Accumulation

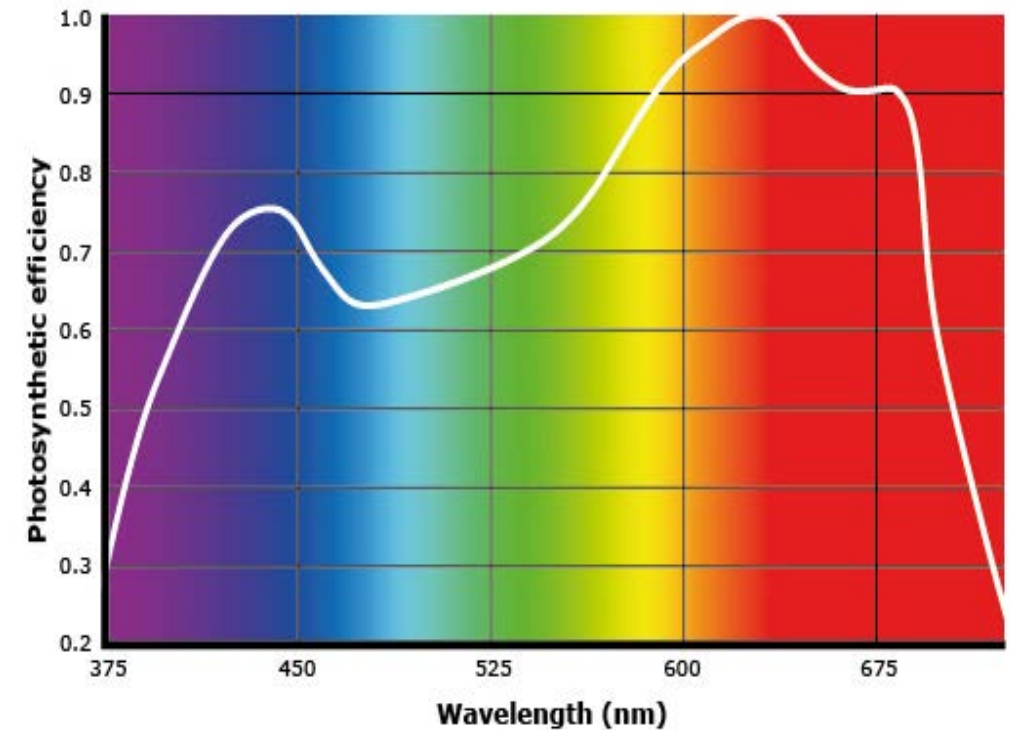
Economic Metrics

- Yield Per Square foot of Canopy
- Wattage Per Square Foot of Canopy
- Operating Cost per unit of Bio Mass



- **Red Spectrum:** Generally Promotes Flowering and fruiting processes
 - Causes Stretching in Plants
- **Blue Spectrum:** Generally Promotes Stem and leaf growth
 - Blue dominant light sources also promote closer internodal spacing in plants.
- **Green Spectrum:** Least efficient single light source for photosynthesis, but has furthest canopy penetration.
 - Shows natural plant colors, and acts as an action spectrum in morphological processes.
- **UVA and UVB:** Help prevent pest, mold and mildew. UVA helps with morphological processes.

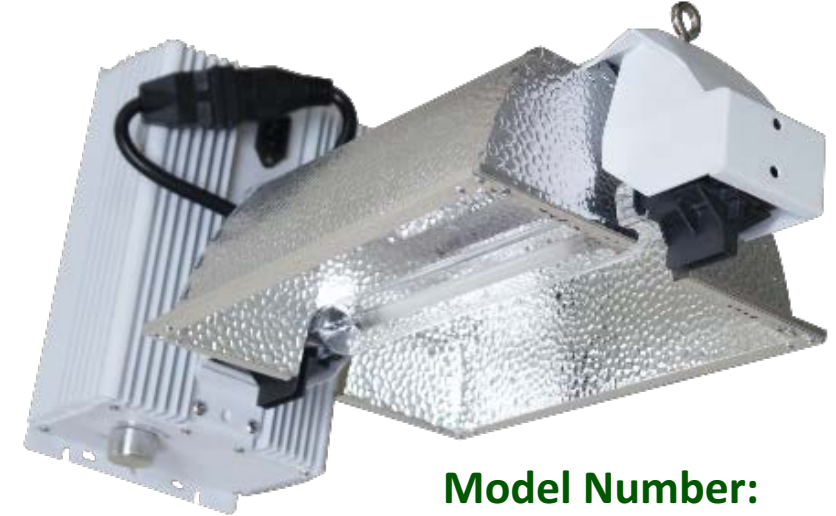
McCree Curve



Features:

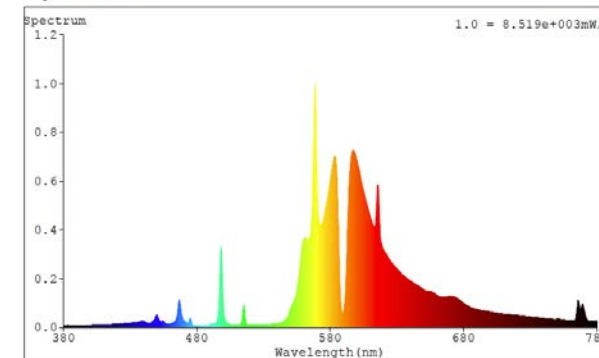
1. Passive Cooling Design
2. High efficiency Ballast: Input Power Factor ≥ 0.98
3. Soft Dimming-(400, 600, 750, 850, 1000, 1150)
4. High Voltage Versions
 - A. RJ1 Port Dimmer Compatible
5. PPF:>2000 ($\mu\text{mol/s}$)

1000W Double Ended High Pressure Sodium (Complete Fixture)



Model Number:
PH-1000HPS-F-DE

Spectrum



Warranty:

1. 3 Years Ballast
2. 1 Year (Lamp and Reflector)

Features:

1. Full Spectrum
2. High CRI: ≥ 90
3. UV Spectrum Presence
4. Complete Fixture
(Ballast, reflector, lamp)
5. 3 Year Warranty Ballast
 - a) 1 Year (Reflector, Lamp)

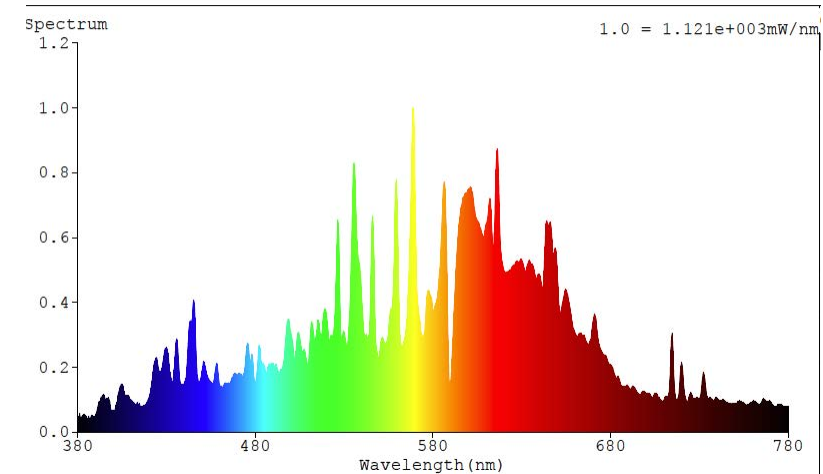


315W Single Lamp

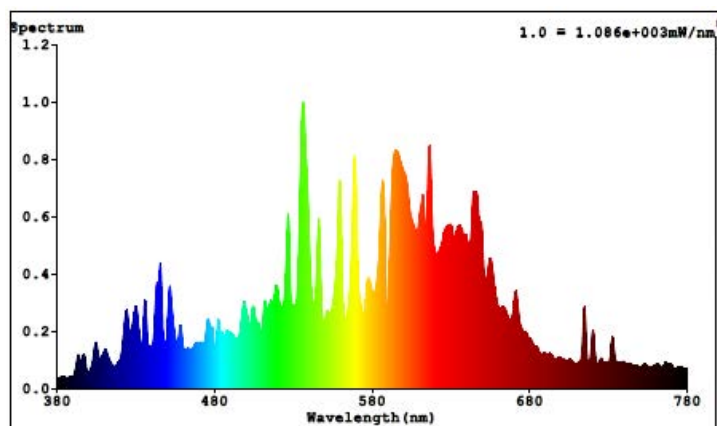


630W Dual Lamp CMH

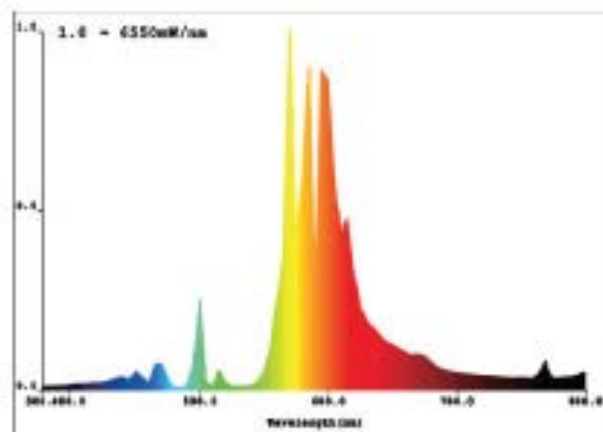
Spectrum



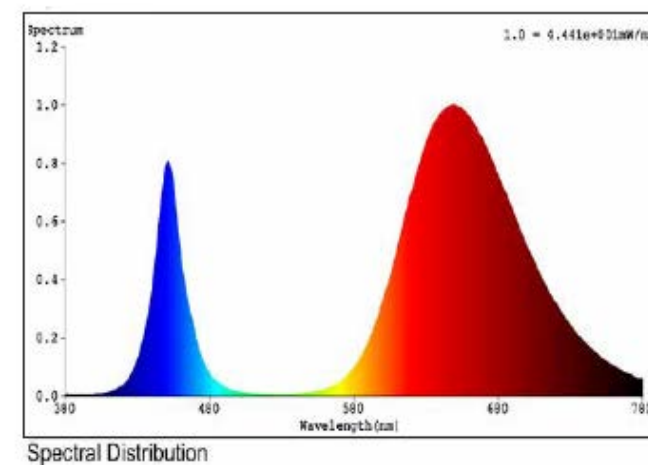
315W CMH Lamp and Spectral Chart:



1000W DE HPS Lamp and Spectral Chart:



Single Ended T8 Lamp and Spectral Chart:



Features:

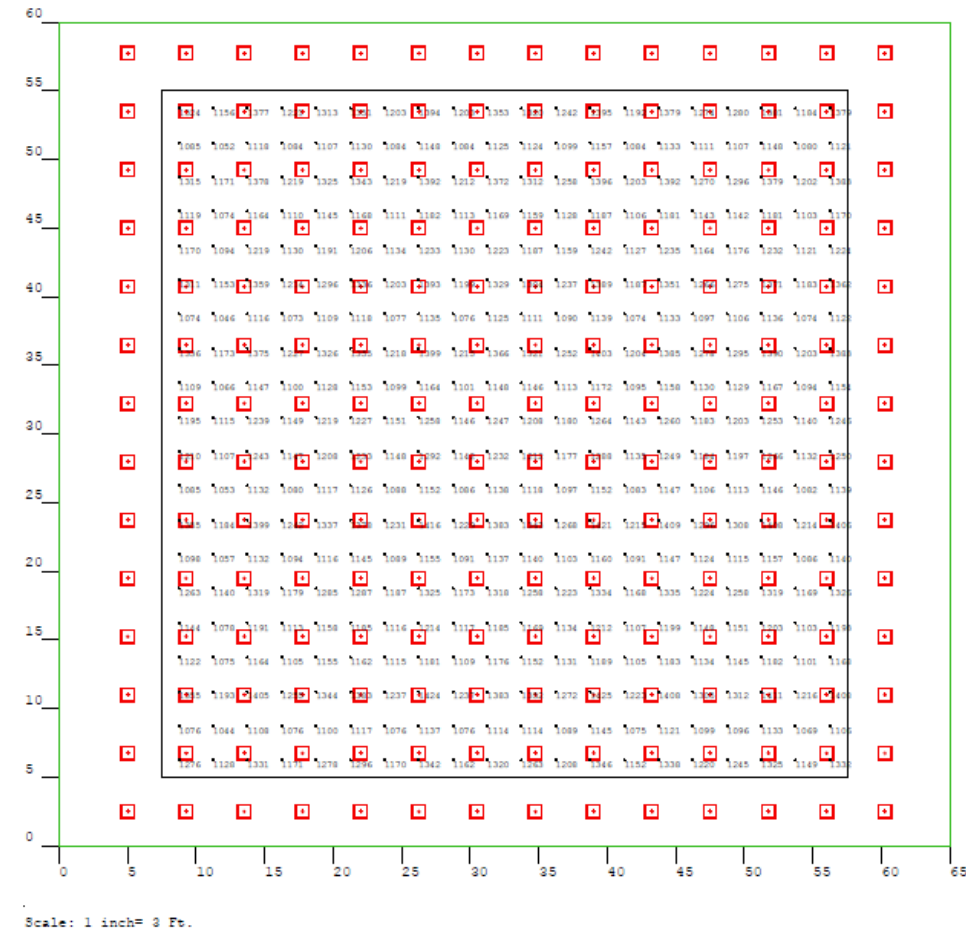
1. 4FT Single Ended Ballast Bypass T8
2. Narrow Spectrum Solution
 - a) Heavy Red: Blue Spectrum
3. Glass Free Design
4. Multiple Lamp Option Fixtures
 - a) 4 Lamp Fixture
 - b) 6 Lamp Fixture
 - c) 8 Lamp Fixture

****Note fixtures and lamps sold separately****



Photometric Services Overview:

- Industry Leading AGI-32 Software rendered layouts
- Photometric Layout Specialist Team on Staff
- 48-72 Hour Project Turn Around Time
- 3-D Renderings available by Request

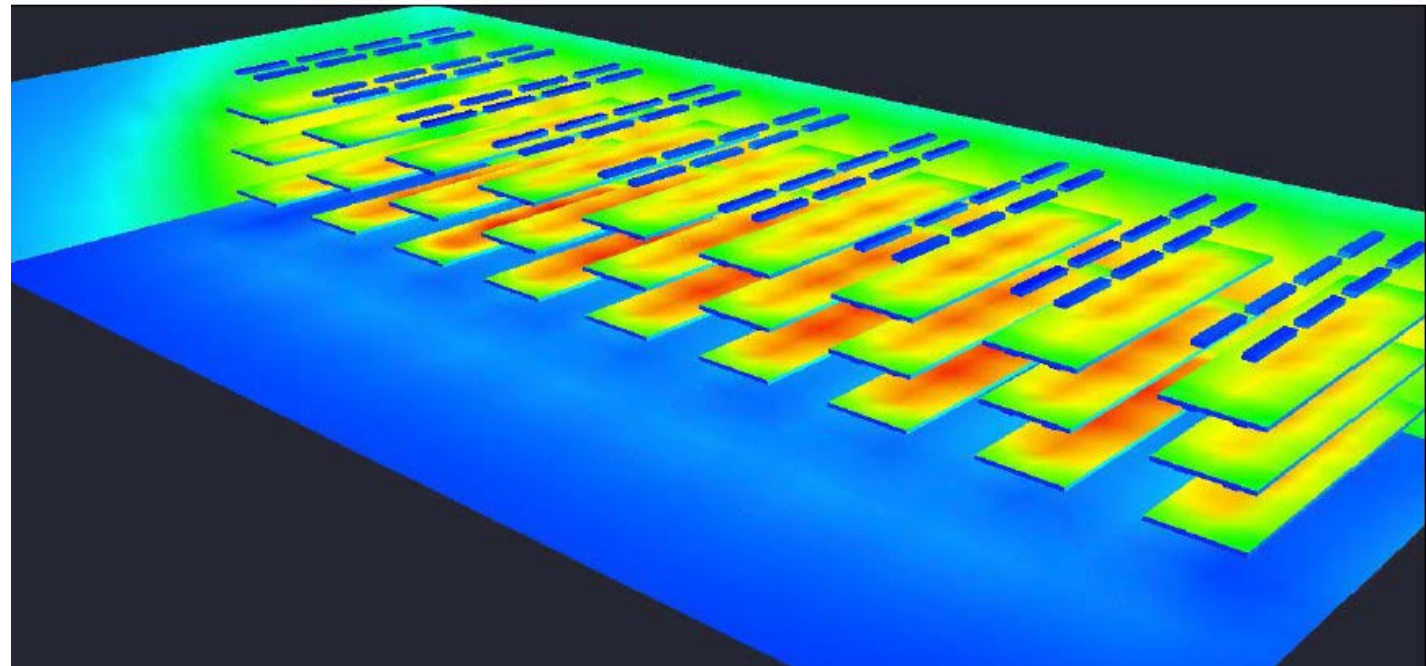


Calculation Summary								
Label	CalcType	Units	Avg	Max	Min	Avg/Min	Max/Min	Description
Room 1 Workplane	PPFD	μmol/sec-S	1202	1425	1044	1.2	1.4	5'

VERTICAL RACKING CLONES/ TISSUES, EXAMPLE CANNABIS:

Room Summary

- Target PPFD: 150 $\mu\text{mol}/\text{m}^2/\text{s}$
- Fixture Mounting Height: 12"
- Canopy Square Footage:
Approx. 2500

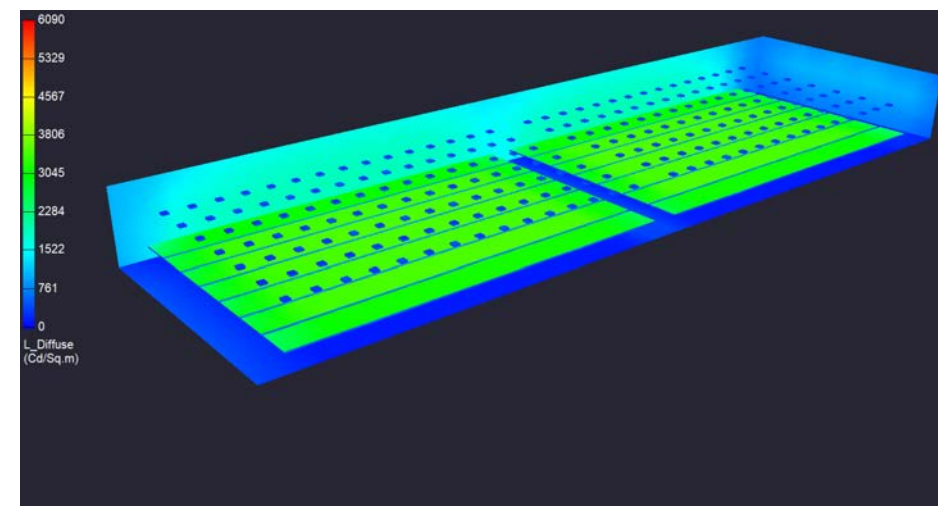
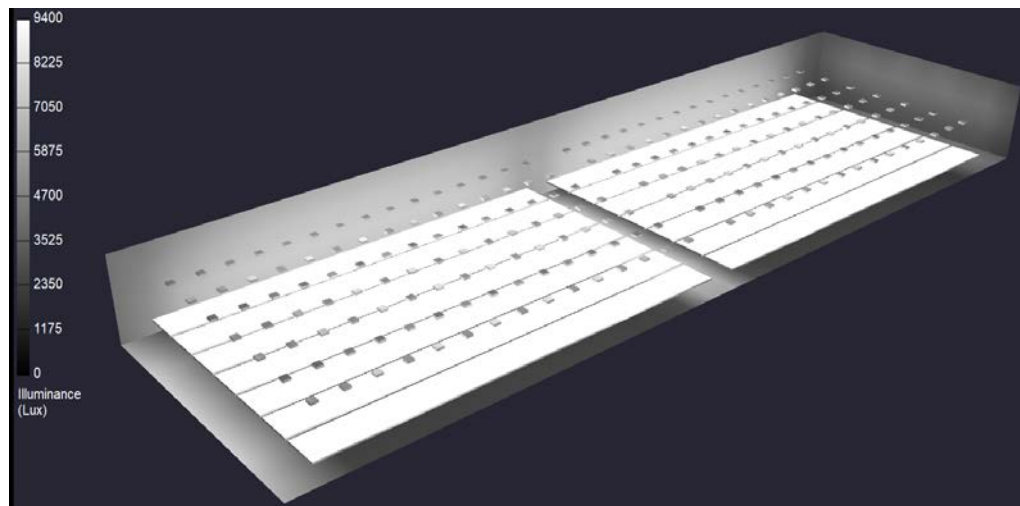


*Image shows typical racking system for nursery/clones

STOCK/MOTHER ROOMS:

Room Summary

- Target PPFD: 500 $\mu\text{mol}/\text{m}^2/\text{s}$
- Mounting Height: 5' Feet
- Canopy Square Footage:
Approx. 4,500 sq'

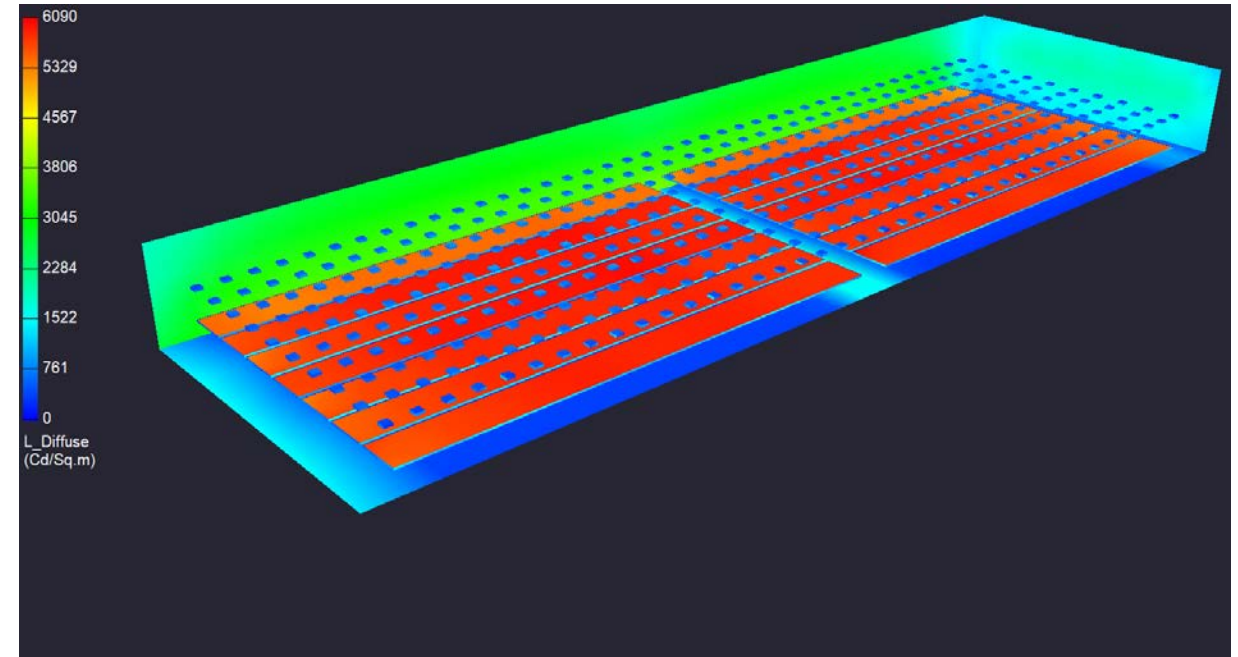


*Images show typical example of a vegetative phase cannabis room.

GROW/FLOWER/VEG ROOMS:

Room Summary

- Target PPFD: 700-1,100 $\mu\text{mol}/\text{m}^2/\text{s}$
- Mounting Height: 4' from Canopy
- Canopy Square Footage: 2,500-4,500sq'



*Image depicts Approx. Maximum PPFD threshold Cannabis. Fixture count determined by final photometrics.

- **Form Factor:** Lighting plans are oriented at minimizing light shading so to maximize utilization of natural light.
- **Target DLI:** Average Solar intensity (DLI) in your region per day, dictates the necessary supplemental lighting to hit target growth levels.
- **Heating and Cooling:** Depending on your region, lighting can influence your heating and cooling.
 - HID fixtures give off Infrared Light (IR)
 - (IR) Increases Temperature on Plants leaf surface
 - Increases A/C in the summer, and can reduce heating in the winter
- **Electrical Rates:** Cost of electricity, either operating or to increase capacity, influences lighting technology decision



Dealer Banner's



PhotonMax NEW Look Data Sheet's



Trifold Brochure's



PHOTONMAX MICROSITE

MaxLite®

- PhotonMax Horticulture fully dedicated Portal
- Total Product Overview
- Product Info-One Stop Show
- Visit at: <http://www.maxlite.com/PhotonMax>



DLC Overview

- June 2018 (Draft Two-Released if Necessary)
- September 2018: Final Policy Release-QPL Update
 - <https://www.designlights.org/workplan/horticultural-lighting/>



ASABE

(American Society of Agricultural and Biological Engineers)

- ANSI/ASABI S640: Quantities and Units of Electromagnetic Radiation for Plants
- ANSI/ASABE X642: Recommended Methods for Measurement and Testing of LED products for Plant Growth and Development
- ANSI/ASABE:X644: Under Review



1. Identify the application

- A. Indoor
- B. Vertical Farming
- C. Greenhouse

2. Identify the end user, or customers goals

- A. Determine Cultivation plan, and work flow
- B. Investment Cost VS. Operating cost (Target ROI)
- C. Identify customers performance metrics for lighting

3. Involve your MaxLite Horticulture Team Member for further assistance.





Photon[™]Max[™]

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MAXLITE UNIVERSITY

The MaxLite University Lighting Degree program offers three comprehensive courses in lighting fundamentals, ranging from beginner to advanced learning. It's free and eligible for the following continuing education units from the American Lighting Association:

- **Lighting Fundamentals - ALA: 4 CLC Credit Hours**
- **Lighting Fundamentals (Intermediate) - ALA: 2 CLC Credit Hours**
- **Lighting Fundamentals (Advanced) – ALA: 3 CLC Credit Hours**



Welcome to
MaxLite
UNIVERSITY

for Lighting
and Technology

Click Here
To Get Started

The department function is to train and provide product training material for all MaxLite representatives, customers and employees. The goal of the department is to educate the staff and rep network to a full and complete understanding of our products, technologies, marketplace, and business environments. We endeavor to educate how and why lighting functions, repair and replacement, as well as compare to competitors or listing requirements. We will accomplish this by providing the tools and services proactively and as needed to supplement.

MAXLITE ON SOCIAL MEDIA

Follow & Share MaxLite On Social Media

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- Twitter
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THANKS FOR ATTENDING!

QUESTIONS/ANSWERS

Thank you everyone for your attention! Please feel free to use this opportunity to ask any questions you may have about MaxLite or the products shown in this presentation.

FOR MORE INFORMATION ABOUT OTHER MAXLITE PRODUCTS, OR
FOR LIGHTING QUESTIONS IN GENERAL; PLEASE CONTACT:

info@maxlite.com

<http://www.maxlite.com>

1-800-555-5629