

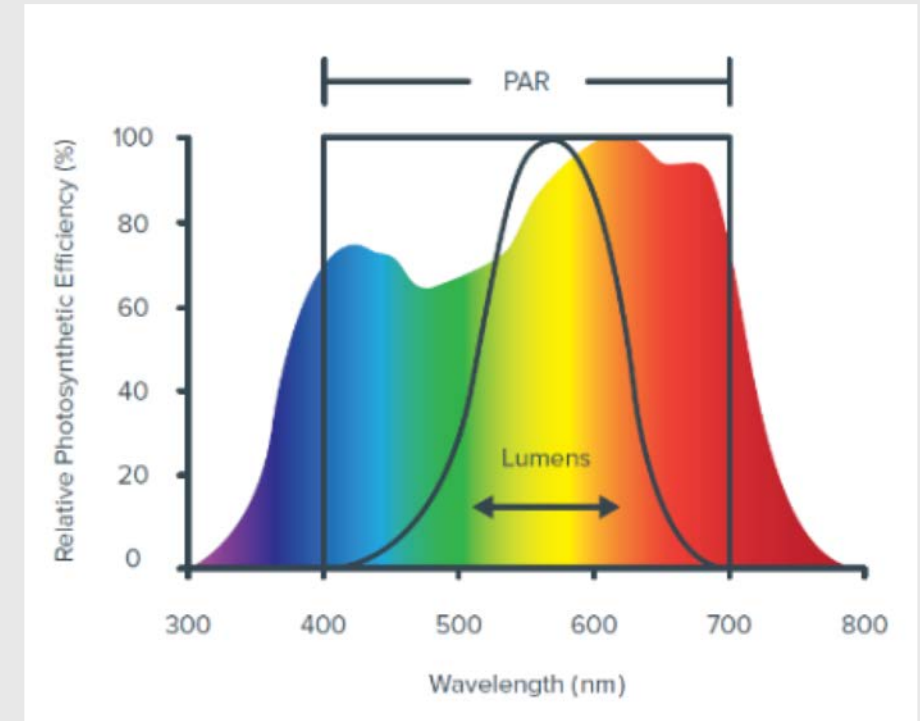
**Photon** **Max**<sup>®</sup>

HORTICULTURE LIGHTING SOLUTIONS

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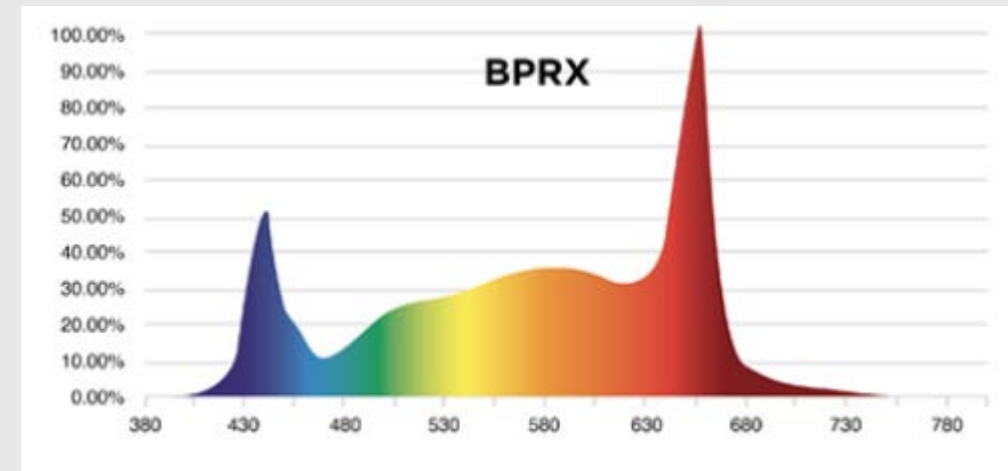
# Educational Segment

- 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

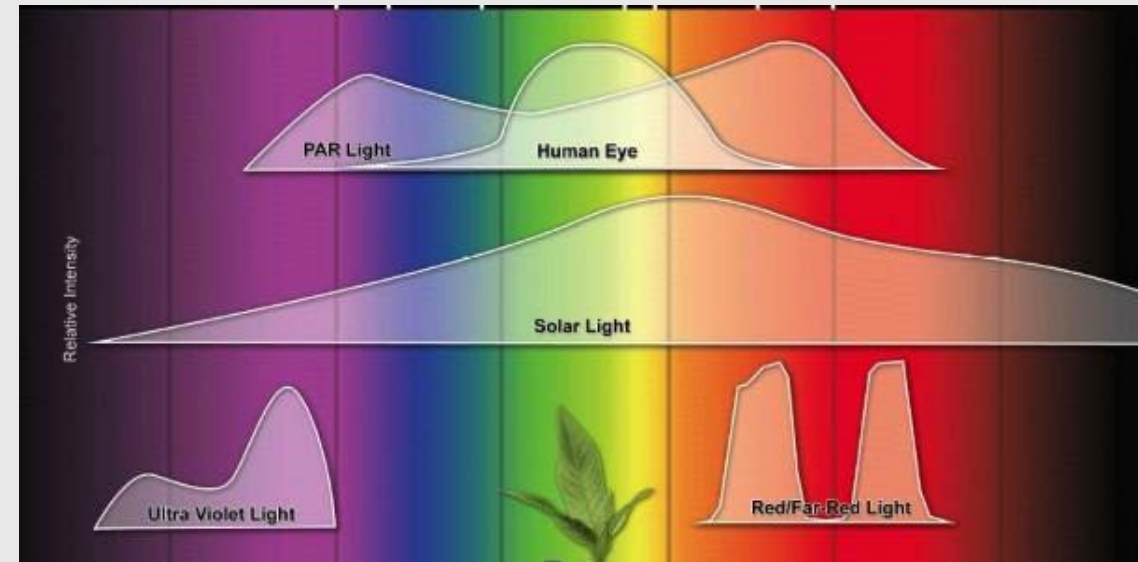


“Lumens are for humans!”

- **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:**  
Example Image to the right
- **Stage of Growth:**  
(Clones seedlings, Vegetative, Fruiting/Flowering)



- **Red Spectrum:**  
Generally Promotes Flowering and fruiting processes
  - Causes Stretching in Plants
  - Most Efficient Spectrum in grow lighting
- **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.



## 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



# Applications



## Greenhouse “Non-Cannabis”

- Vine crops: Tomato, cucumber, etc.
- Leafy greens: Lettuce, kale, microgreens, etc.
- Ornamentals and Potted/Bedding Plants: Poinsettias, daisies, begonias, etc.
- Seedlings and Starter Plants: Tomato, Rosemary, Pepper, etc.





- Any type of vertical crop production through the use of multiple layers (i.e. growing crops on pallet racking)
- VF can facilitate any stage of crop production
- Contained Environment Agriculture
- Any type of crop production where plants and/or organisms are produced in a completely controlled environment
- Contained environments are commonly defined as “Growth Chambers”





- Indoor grown: Powered light is sole source of energy for plants
  - Can include multi-tier racking and warehouse single-tier style
- Greenhouse/Hybrid GH: Powered light is supplemental to sun. It is used to bridge the gap in worst case scenario time of year.
  - This can vary based on Security customer wants from lighting to maintain productivity.



# STAGES OF GROWTH FOR CANNABIS

- **Clones/Seedlings-Typical Light Cycle 18 Hours**
  - Typical PPFD Intensity Range-150-200  $\mu\text{mol}/\text{m}^2/\text{s}$
- **Vegetative-Typical Light Cycle 18 Hours**
  - Typical PPFD Intensity Range-400-600  $\mu\text{mol}/\text{m}^2/\text{s}$
- **Fruiting/Flowering-Typical Cycle 12 Hours**
  - Typical PPFD Intensity Range: 850-1100  $\mu\text{mol}/\text{m}^2/\text{s}$





## Lighting Design

MaxLite's Applications team uses industry leading AGI32 and DIALux software for lighting planning, and all layouts are done in PPFd.

### Lighting Planning Services Overview:

- Contact us today for free consultation @ [mstruck@maxlite.com](mailto:mstruck@maxlite.com)
- No limit to revisions
- Applications include
  - Greenhouse
  - Indoor Crops
  - Vertical Farming



## **Features:**

- Available in 360W and 600W
- Delivers up to 2.3 $\mu$ mol/J
- 5 Year Standard Warranty
- Active Cooling
- IP66 Rated
- Available in 120-277V & 347-480V

## **Available in 4 Spectra Options**

- BXRF: Blue 450nm with Heavy Red 660nm and Far Red 730nm
- FSRF: Full Spectrum with Heavy Red 660nm and Far Red 730nm
- BPRX: Broad Par with Heavy 660nm
- BPRF: Broad Par with Heavy 660nm and Far Red 730nm



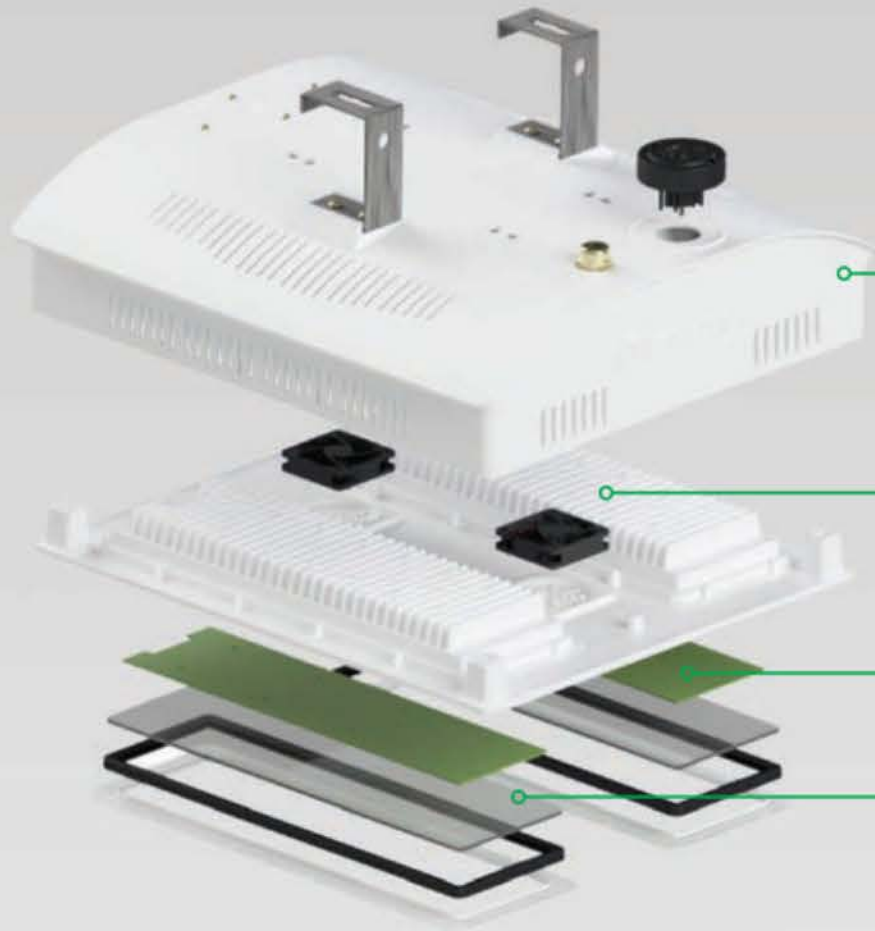
# PERFORMANCE



- High light output, PPF up to 1,358  $\mu\text{mols}$
- High efficiency up to 2.3  $\mu\text{mol/J}$
- 4 spectrum distributions to choose from



# QUALITY



Die cast aluminum housing with a TGIC polyester powder coat

Active thermal management via two cooling fans

Photon Flux Maintenance >Q90 42,000 hours

Tempered Glass Lenses



- Listed for use in wet locations to UL standards and IP66 rated

# DESIGN



- Designed in the U.S.A. by Horticulture Lighting Engineers
- Specifically designed to optimize LED performance for Horticulture applications

# HIGH STANDARDS



- 1st with DLC Horticulture
- 1st with UL Performance

## Features:

- Available in 200W and 300W
- Delivers up to 2.8 $\mu$ mol/J
- Passive Cooling Design
- IP65 Rated
- Linkable up to 3 Fixtures via 3FT Jumper Cables (Varies on Wattage)
- Available in 120-277V & 347-480V
- 5 Year Standard Warranty

## Available in 3 Spectra Options

- BPRX: Broad PAR with heavy 660nm
- BPBX: Broad PAR with heavy 450nm
- FSRX: Full spectrum with heavy 660nm



- **315W Ceramic Metal halide Complete Fixture:**
  - Voltage Range-120-240V & 220-277V Available
  - Full Spectrum Solution
  - Ideal for all stages of growth



- **630W Ceramic Metal Halide Complete Fixture:**
  - Voltage Range-120-240V & 220-277V Available
  - Full Spectrum Solution
  - Ideal for all stages of growth



- **1000W DE HPS Complete Fixture:**
  - Voltage Range-120-240V & 220-277V Available
  - Most predominantly used fixture type in the world





# APPLICATIONS



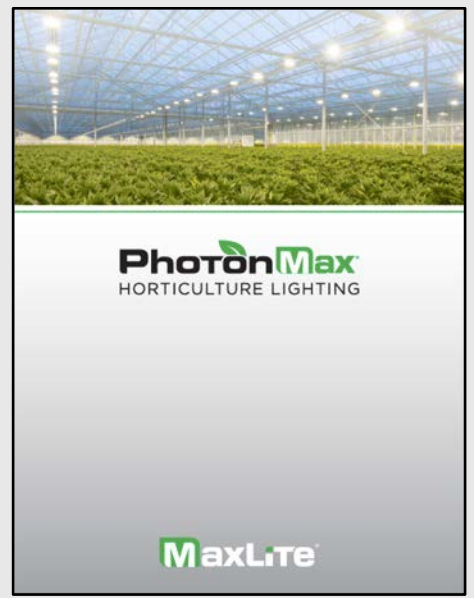




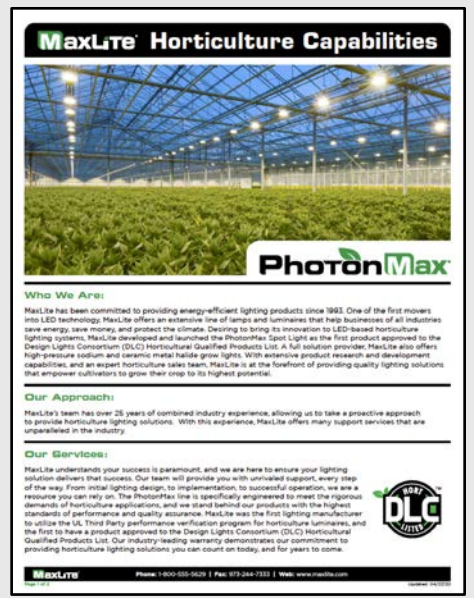
<http://www.photonmax.com>



**Spot Light Brochure**  
Item # SPOTLIGHTBRO  
Order Code: 103155



**PhotonMax Brochure**  
Item # PHOTONMAXBRO  
Order Code: 100667



**Horticulture Capabilities Flyer**



[PhotonMax Horticulture Lighting Video](#)



# PhotonMax<sup>®</sup>

## HORTICULTURE LIGHTING SOLUTIONS

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**Photonmax.com**  
To Learn More!



### PhotonMax LED Spot Light

The MaxLite, Horticulture LED SPOT LIGHT delivers powerful lighting, in a sleek form factor ideal for supplemental and sole source applications. The lighting solution offers an extraordinary blend of performance, high output and photon efficacy.

[Learn More](#)



### PhotonMax LED Linear Light

The PhotonMAX Horticulture LED LINEAR LIGHT delivers powerful lighting in a sleek form factor, ideal for supplemental and sole source applications. Designed for maximum utilization of natural light in greenhouse applications, as well as high intensity vertical farming crops.

[Learn More](#)



### PhotonMax Non-LED Grow Lights

PhotonMAX metal halide and high pressure sodium products provide reliable performance that optimizes plant growth in greenhouses and indoor operations of all sizes.

[Learn More](#)