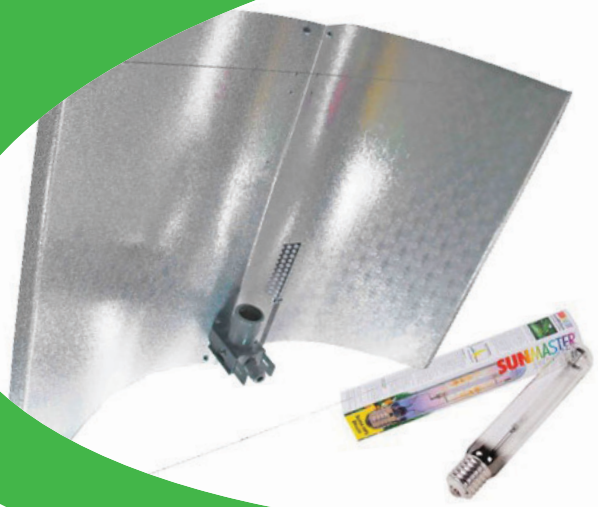
pro-emit®

400W HPS vs. 400W LED

Comparing the two 400W setups

In this section we will show you the differences between a High Pressure Sodium light and COB-LEDs and highlight why the LED system represents a big step forward in the field of plant lights. We will begin with a look at the basic equipment. Since we want to compare the efficiency of both systems, we'll put together two 400 watt setups.



VS.

400w High Pressure Sodium

Components:

400w HPS bulb (i.e. Sunmaster)
400w light ballast
reflector(Adjust-A-Wing) and socket
cables

HPS data:

lumen: ca 52.000lm
luminance efficacy: up to 130lm/w
thermal loss: at least 60%
efficiency: 25%-40%

8x Cree LEDs each 50w

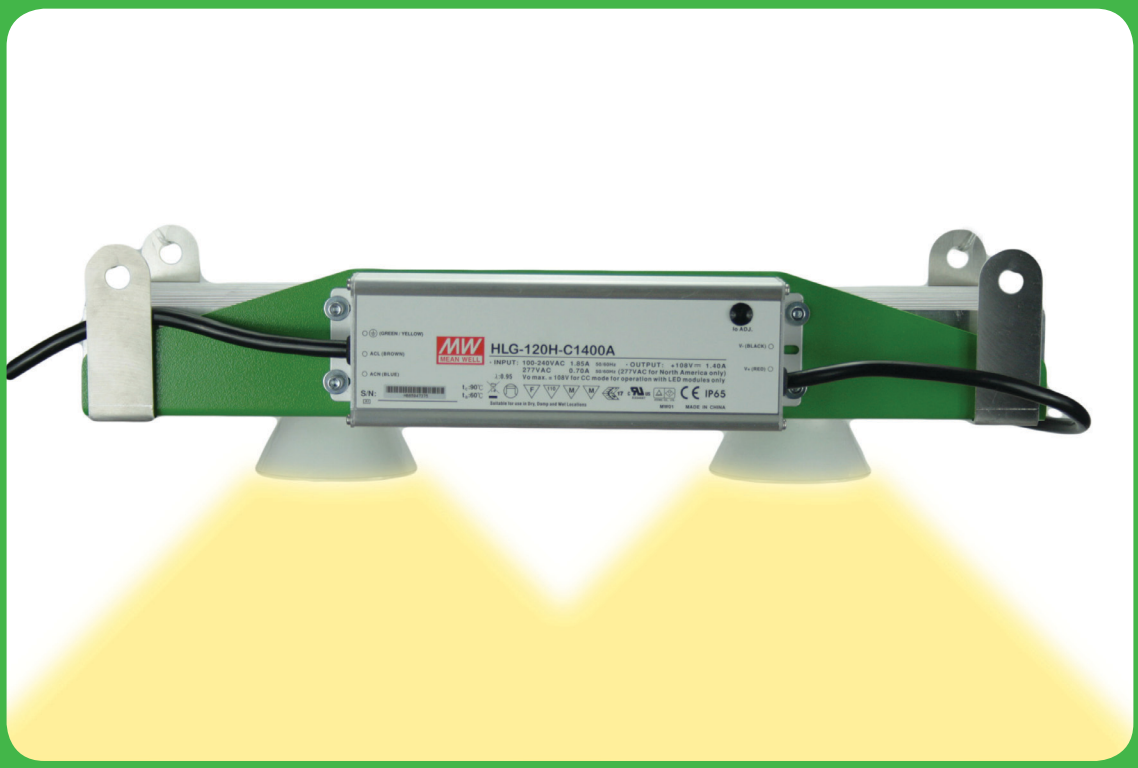
Components:

8x Cree LEDs (CXB 3590) each 50w
drivers
cooling element
cables, angle brackets, mounts

8x LED chips data:

lumen: ca 72.800lm (at 8x50w)
luminance efficacy: up to 182lm/w
thermal loss: at least 35%
efficiency: 45%-65%

Gas-discharge lamps like High Pressure Sodium lights spread their light in all directions. As a result 50% of the light needs to be reflected which in turn leads to a considerable loss of light. Our LED plant lights equipped with Cree LED-chips have a dispersion angle of 115°. Combined with the right set of reflector and holder nearly all of the light can be directed at the plants at a dispersion angle of 90°.

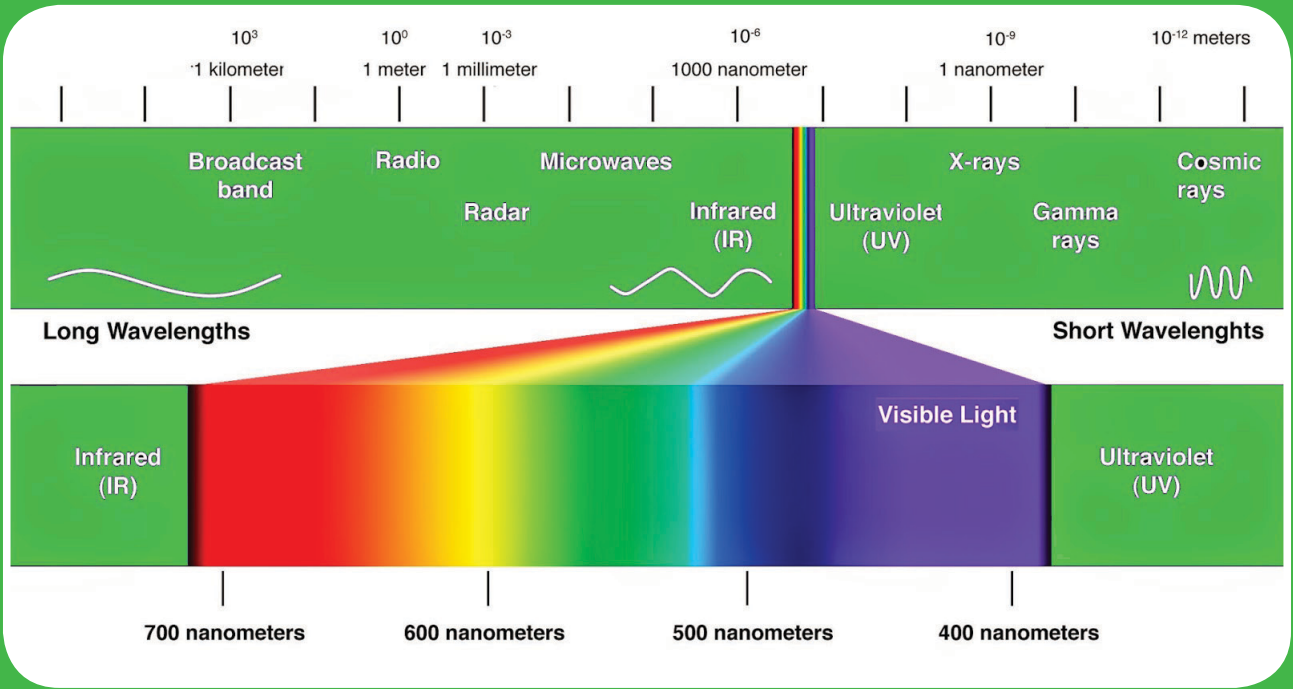


After comparing setups and technical performance values of High Pressure Sodium lights and Cree LEDs we will now cover some essentials and then show the results of our comprehensive tests.

The spectrum of visible light

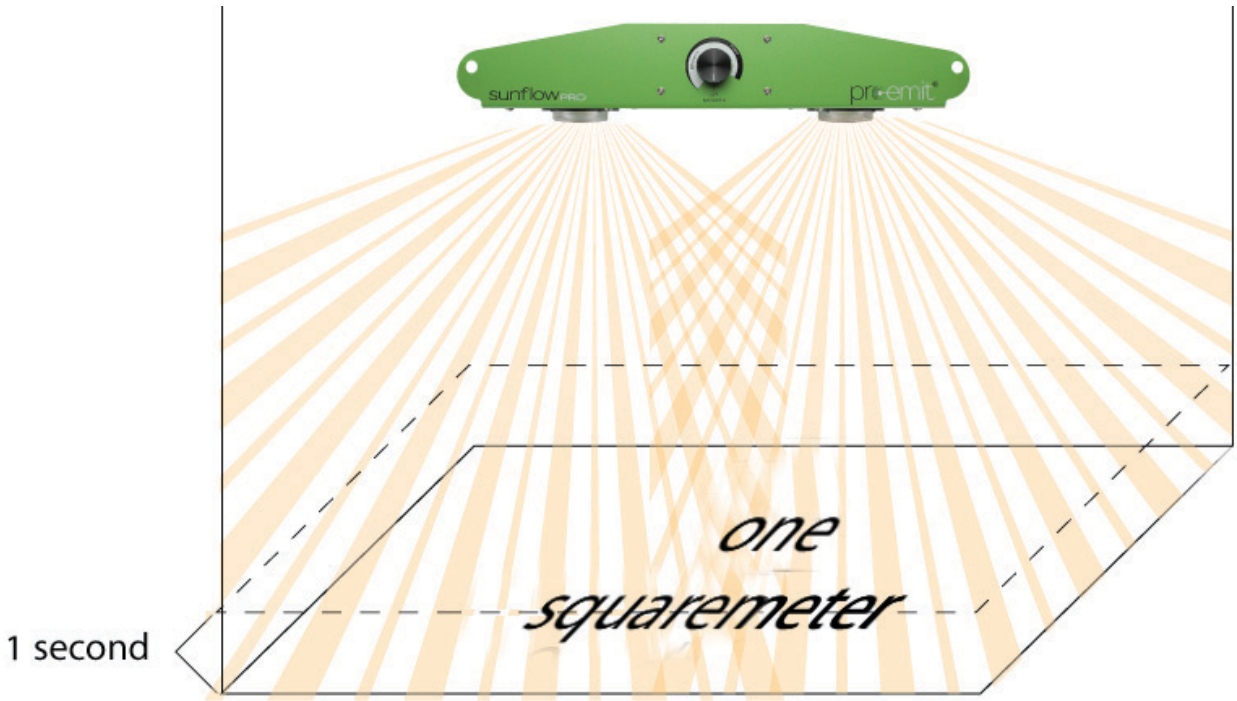
The key to evaluating the performance of a plant light is measuring its PPFD-value (Photosynthetically Active Photon Flux Density).

Photosynthetically active radiation denotes the spectrum of sunlight which is used by photosynthetically active lifeforms for growth and flower formation. This spectrum encompasses wavelengths from about 400nm (high-energy blue light) to 700nm (low-energy red light).



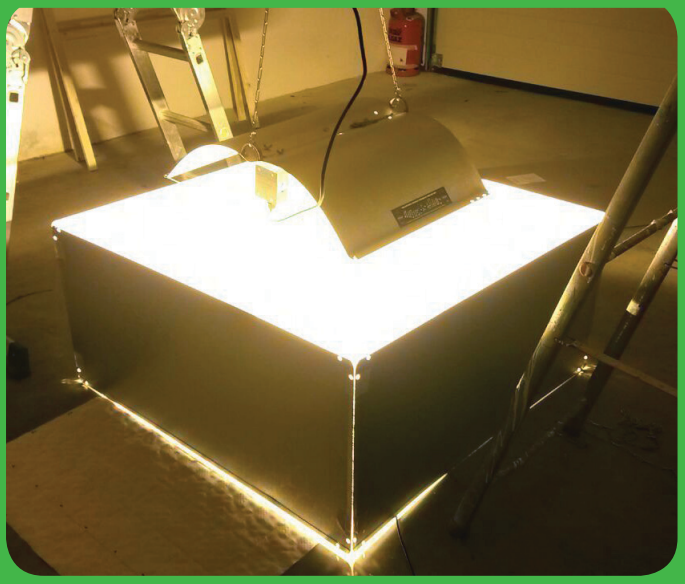
Lumen is for human - let’s measure PPFD

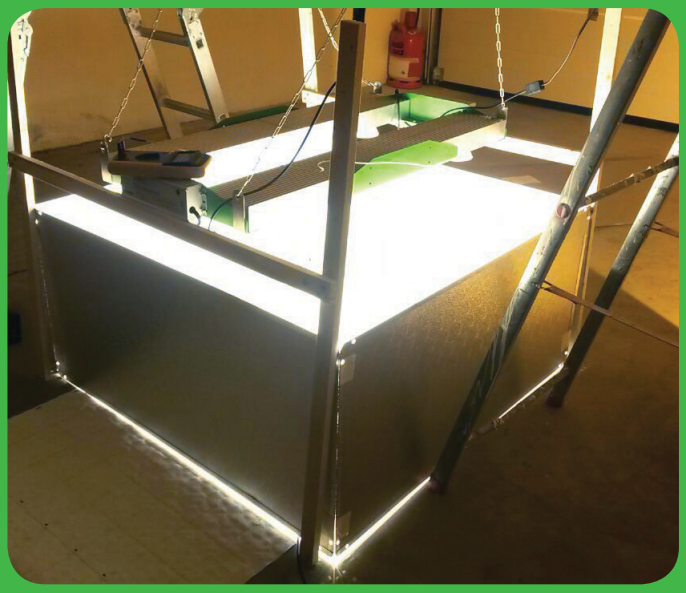
PPFD-values are specified in micromole per square meter and second. The PPFD-value states how many photosynthetically active photons hit an area of 1 square meter over the course of 1 second. When evaluating a plant light it is important to measure its PPFD-value on several different spots to determine a sound average. This average PPFD-value can be used to determine how effectively a plant light will stimulate plant growth.



Measurement Setup

For our tests we pitted a classic 400 watt HPS light against a bundle of two 200 watt DIY-M-KITs. Both DIY-M-KITs run four high-performance Cree CXB 3590 Chips each. They were connected by 640mm brackets to ensure optimal illumination. During the test all lights were installed 45cm above the measuring surface. Both setups, the LED chips and the HPS, illuminated an area of exactly one square meter.

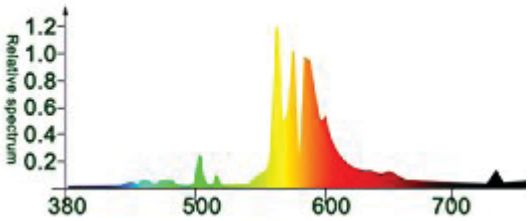




400W HPS

measured area 1m² - 45cm distance

μ^2s) 0-200 200-400 400-600 600-800 800-1000

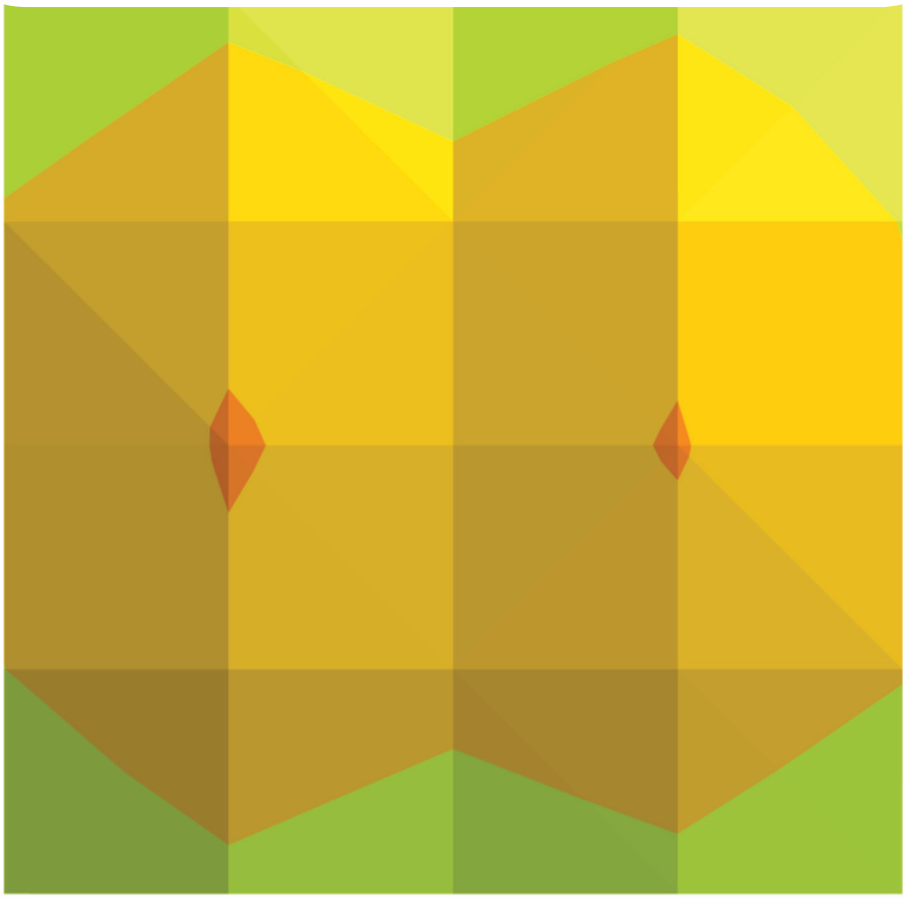


Ø = 618 µmol/m²s

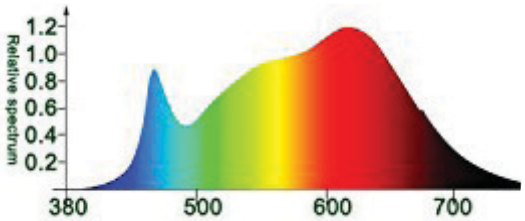
- average PPFD of 618 µmol/m²s
- light distribution shows clear fall-off towards the edges
- light spectrum almost exclusively confined to yellow-red zone

400W LED

measured area 1m² - 45cm distance



PPFD (µmol/m²s) 400-600 600-800 800-1000 1000-1200



Ø = 811 µmol/m²s

- average PPFD of 811 µmol/m²s
- even light distribution and overall higher values, especially on the edges
- full white color spectrum covering all color temperatures

Visualizing the measured data clearly shows that the COB-LEDs reach significantly higher PPFD values than the High Pressure Sodium light. While the HPS reached an average of 618 µmol/m²s, the LED plant lights surpassed this value with 811µmol/m²s under the same conditions.

While both light set ups operate on the same nominal power, the higher effectiveness of the Cree CBX LED chips leads to an overall significantly higher efficiency factor. As a result the LEDs can be dimmed to achieve the same output while using less energy than the HPS. Wether you need lights for plant propagation, overwintering, growing or flower phases - thanks to its high PPFD-value, LED technology is ideal for all aspects of plant lighting.

Thank you for your interest!
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