



The Mystery of Controlling Plant Growth

Light, water, air are the three elements of plant growth. Among them, "light" has direct regulatory effects on Photosynthesis and plant growth. Even more, different plants have different requirements from light. As time goes by, spectral technology and equipments are getting mature, applying it on horticulture field are taking advantages as below:



LED light wavelength coincides with plant requirements

LED visible spectrum wavelength is 380-780nm, the Photosynthesis visible spectrum wavelength is about 400-700nm. We can evaluate light quality, light density and light uniformity by intelligent detection of spectrum. From the experiment results we know that blue light (400-500nm) and red light (610-720nm) are contributed to the growth and flowering of vegetables and flowers.



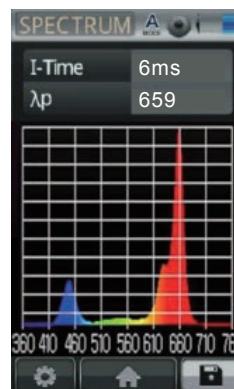
Spectrum and light intensity can be adjusted by users

The LED can emit monochromatic light which is needed by plants so that R&D may adjust the light intensity of plants, improve the utilization rate of light energy, and provide the most suitable growth environment for plants by referring the spectrum and the values (PPFD, PFD, LUX, CCT and etc.) which were measured by spectrometer.



Increase space utilization

Most of the cultivators are using multilayers shelves to maximize the space utilization because the changes of the way of crop cultivation. This is not only effective in avoiding natural disasters, but also reduces the cost of renting land. Using spectrometer check the growth cycle of plants can improve production capacity effectively.



BASIC	
CCT	4753 K
PFD-UV	0.01
PFD-B	1.02
LUX	385.3
PPFD	5.08



Knowledge of Primary School

- PAR (Photosynthetically active radiation)-Giving direct light on the plants can speed up the growth. The light from 400 - 700nm wavelength is closely related to photosynthesis.
- PPF (Photosynthetic photon flux)- The number of photons are emitted per second within the range of light (400 -700 nm).
- PFD-Ultraviolet radiation- The number of photons are emitted per second within the range of light (380 -400 nm).
- PFD-Blue light- The number of photons are emitted per second within the range of light (400 -500 nm).
- PFD-Green light- The number of photons are emitted per second within the range of light (500 -600 nm).
- PFD- Red light- The number of photons are emitted per second within the range of light (600 -700 nm).
- PFD- FR- The number of photons are emitted per second within the range of light (700 -780 nm).
- PPFD (Photosynthetic photo flux density)- The number of photons are emitted per second within the range of light (400 -700 nm) in every square meter.



MK350S

BASIC	
CCT	4753 K
PPFD	5.08
PFD-G	2.59
PFD-R	1.47
PFD-FR	0.27



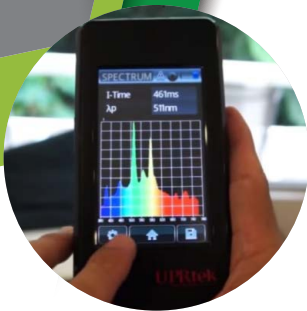
PG100N

PPFD	
PPFD 400-700nm	11.59 $\mu\text{molm}^{-2}\text{s}^{-1}$
PFD-B 400-500nm	2.87
PFD-G 500-600nm	5.68
PFD-R 600-700nm	3.03

PFD	
PFD 380-780nm	11.59 $\mu\text{molm}^{-2}\text{s}^{-1}$
PFD-UV 380-400nm	3.03
PFD-FR 700-780nm	5.68

 Measurement Description

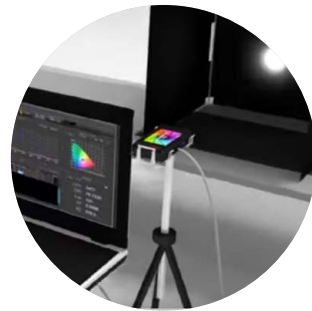
Multiple measurement solution provider, unlimited capturing the real light output, and making effective communication with customers.



▲ Stand-alone Measurement



▲ APP Measurement



▲ PC SW Measurement




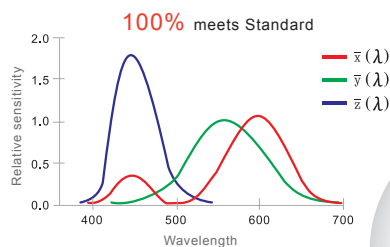
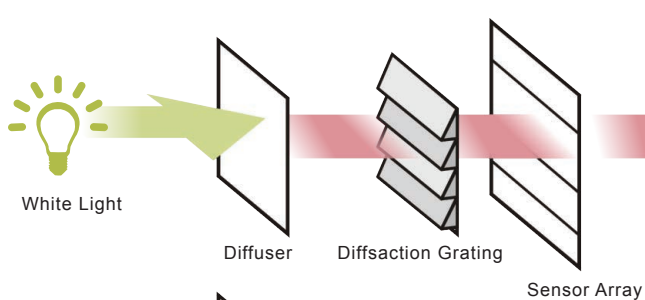
▲ Automatic Equipment System built-in Measurement

 Application Categories



Differences Of Spectral type and RGB Filter Type

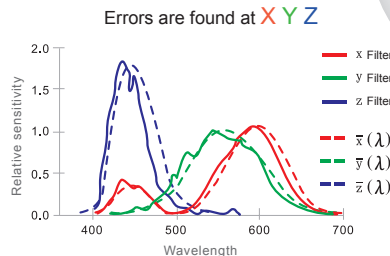
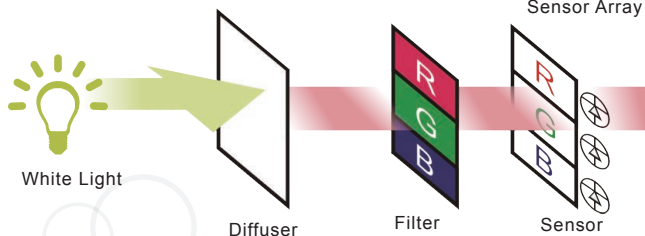
Type	Technology	Components	Concept	Result
 Spectrometer	Spectral Type	Diffuser Diffraction Grating Sensor Array	Light source go through the "Diffraction Grating and Sensor Array" to collect the spectrum and dispers the light for analysis.	Obtain spectral energy and come out the CIE XYZ
Color Analyzer	RGB Filter Type	Diffuser Filter Sensor	Light source go through the "Filter and Sensor" and execute light analysis.	Sensor provides the CIE XYZ directly.
<p>Summary:</p> <p>1. Spectrum information: Spectrometer (✓); Color Analyzer (✗)</p> <p>2. CIE XYZ accuracy: Spectrometer > Color Analyzer</p>				



Visible-region relative spectral response characteristics (f1')

Spectral Type : f1' < 1%

RGB Filter Type : f1' < 4-5%



Product Features & Competitive Advantages

- ⊙ In-house RD team, one-step production and direct sale service.
- ⊙ All in One—One in All design with multi-measurement.
- ⊙ Professional spectrometer tool with post-analysis software.
- ⊙ Integration ability on optical, mechanical and electronic for customized service.
- ⊙ Globalization of marketing and support service system guaranteed.



Test by NIST

