PAR (Photosynthetically active radiation)

Definition:
Photosynthetically active radiation, often abbreviated PAR, designates the spectral range of solar radiation from 400 to 700 nm that photosynthetic organisms are able to use in the process of photosynthesis.

Explain:
**PPFD (Photosynthetic Photon Flux Density)**

**Definition:**
PPFD is a value that explains how many photons in specific range (it’s from 400-700nm for plant growth) of the visible light spectrum (photosynthetic active radiation or PAR) that fall on a square meter of target area per second. The unit is µmol/m²s.

In SGAL, you not only can check the total visible PPFD value but also check the value in different range (UV for 380 ~ 390 nm, Blue for 400 ~ 499 nm, Green for 500 ~ 599 nm, Red for 600 ~ 700 nm, IR for 701 ~ 780 nm) for light adjustment.

**YPFD (Yield Photon Flux Density)**

**Definition:**
Because PPFD is just calculated from a known spectrum but not related to plant light response. To check how efficient the light for plants, have to weight the value by required PAR action spectrum to get Yield Photon Flux Density (YPFD). The Value will change when the reference PAR action Spectrum changes.

In SGAL, you not only can check the total visible YPFD value but also check the value in different for light adjustment.
Spectrum

Definition:
SGAL also provides 3 types of spectrum

Original Spectrum: Vertical axis is relative intensity
PPFD Spectrum: Vertical axis is PPFD
Weighted Spectrum: Vertical axis is YPFD, will change when the reference PAR action Spectrum changes

Explain:

Efficiency

Definition:
Efficiency is the value that express how well the PPFD spectrum fit the PAR action Spectrum.

The value is from 0 to 100% and it will change when the reference PAR action spectrum changes.

Explain:
R/B Ratio

Definition:
R/B ratio is to check the PPFD ratio between Red part (600~700nm) and Blue part (400~499nm).

You can use this information to adjust to plant growth light.

Explain:

R/IR Ratio

Definition:
R/IR ratio is to check the PPFD ratio between Red part (600~700nm) and IR part (701~780nm).

You can use this information to adjust to plant growth light.

Explain:
**DLI (Daily Light Integral)**

**Definition:**
Daily light integral (DLI) is the amount of PAR received each day. It is expressed as moles of light (mol) per square meter ($m^{-2}$) per day ($d^{-1}$), or: $\text{mol/m}^2d$.

In greenhouses or growth chambers, DLI values are typically much lower, which can affect the shoot/root ratio, morphology, and the timing of flowering.

**Explain:**

![The shoot/root ratio](image1)

![Morphology](image2)

![The timing of flowering](image3)

**Other Items for Plant Light Design**

Other parameters show in SGAL including Lux, $\lambda_p$ (Peak Wavelength), $\lambda_D$ (Dominant Wavelength), CCT (Correlated Color Temperature), CRI (Color Rendering Index) and CIE1931/1976 are more useful for Plant Light Design.

You can also check these explanation in the Knowledge Pages of “Spectrum Genius Mobile“