

Introduction

PAR maps give cultivators a clear picture of expected PAR densities at various mounting heights, and can be used to understand the relationship between uniformity, intensity, and canopy height. PAR maps are generated by taking many measurements across a flat plane under controlled conditions. The resulting maps are colored to indicate relative photosynthetic photonic flux density, or PPFD, in the units of micromoles per square meter, or $\mu\text{mol}/\text{m}^2/\text{s}$.

PAR maps detailed in this document pertain to arrays of FluxScale 600TL fixtures with installed reflectors, which result in highly uniform lighting across the canopy. PAR maps for single fixtures and fixtures without reflectors are also provided.

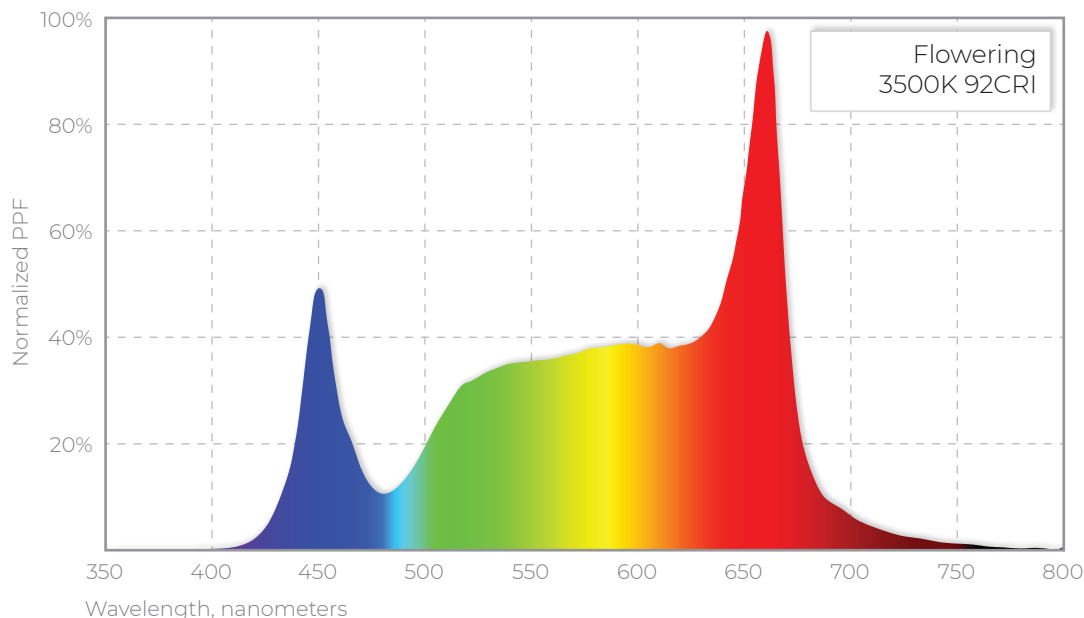
Method

PPFD was measured with an MQ-500 Quantum Sensor from Apogee Instruments, which measures PPFD from 400-700nm. Fixture was operated until engine reached a steady operating temperature. 49 measurements were taken directly below each fixture across a 48" x 48" area at three different heights (18", 24", and 36", measured from glass surface on fixture to top of quantum sensor situated on measurement plane). Three conditions were benchmarked: fixtures with reflectors in an open environment, fixtures without reflectors in an open environment, and fixtures with reflectors in a reflective tent. A Plant House brand tent with reflective walls measuring 48" x 48" x 73" was used for measurements taken with a tent.

For fixture array PAR maps, 28 measurements were taken at intervals outside of the 48" square area, and far field PAR distribution was extrapolated based on these measurements. PAR distribution of arrays of fixtures was calculated with an additive method by overlaying single fixture measurements at the appropriate fixture spacing for the array.

Spectrum

A broad spectrum flowering setting was used to generate PAR maps; this spectrum setting is well suited for high intensity lighting of flowering crops and has a high color rendering index of 92 CRI, allowing for high visual acuity when inspecting crops.

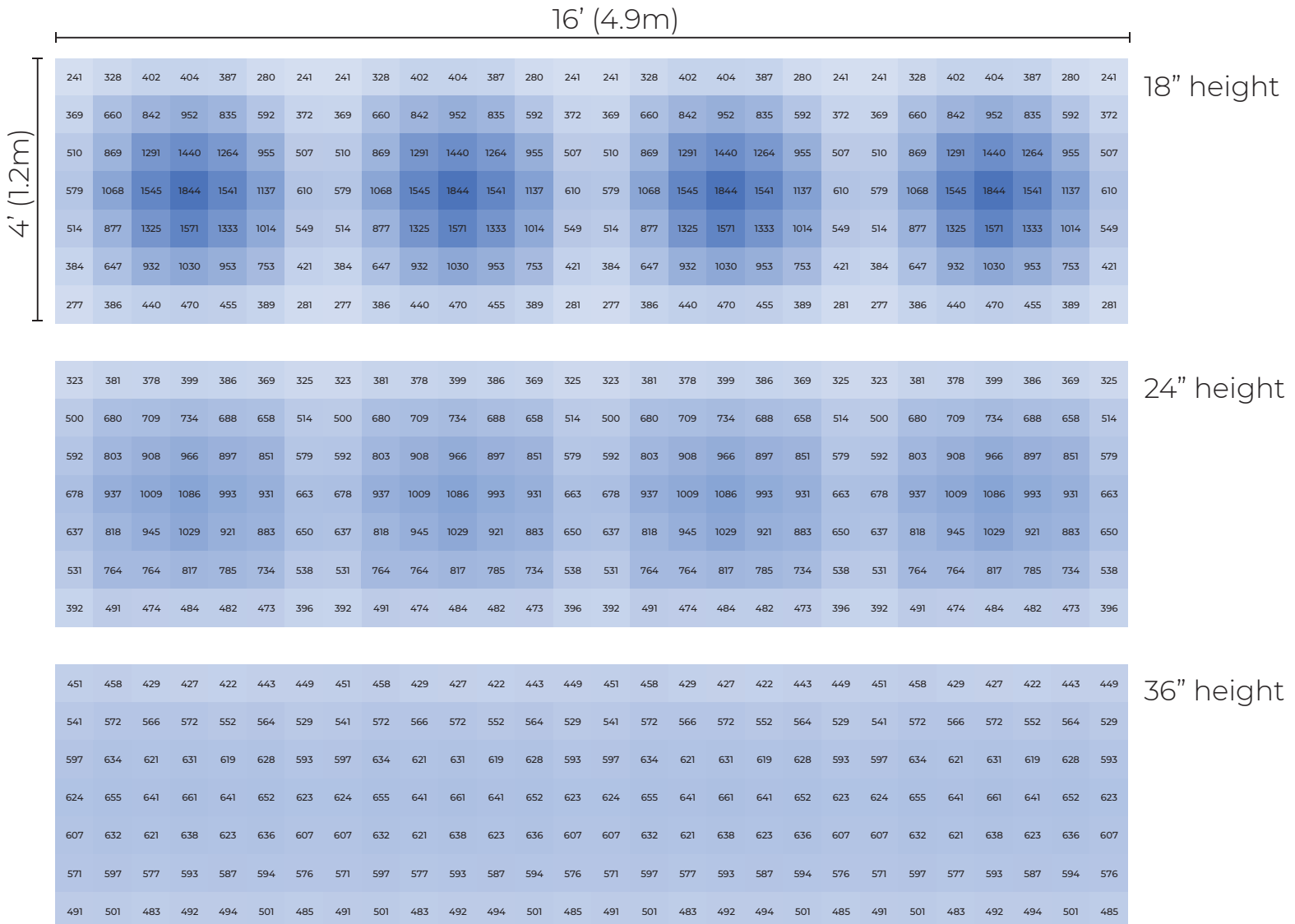


Linear Arrays - Single Rows

These PAR maps are based on a single row of six FluxScale fixtures with open surroundings. These PAR maps are most representative of cultivation spaces with benches or rows spread more than 4' apart.

Test Conditions

Fixture: FluxScale 600TL	Precision PAR: Not configured
Version: 2.0	Engine Temperature: 38C
Installed Spectrum: -VF (vegetative & flower)	Wall plug power: 610W
Precision PAR: Not configured	Spectrum: Flowering (4000K white + deep red, 93CRI)
Reflector installed	Surroundings: open area, no walls

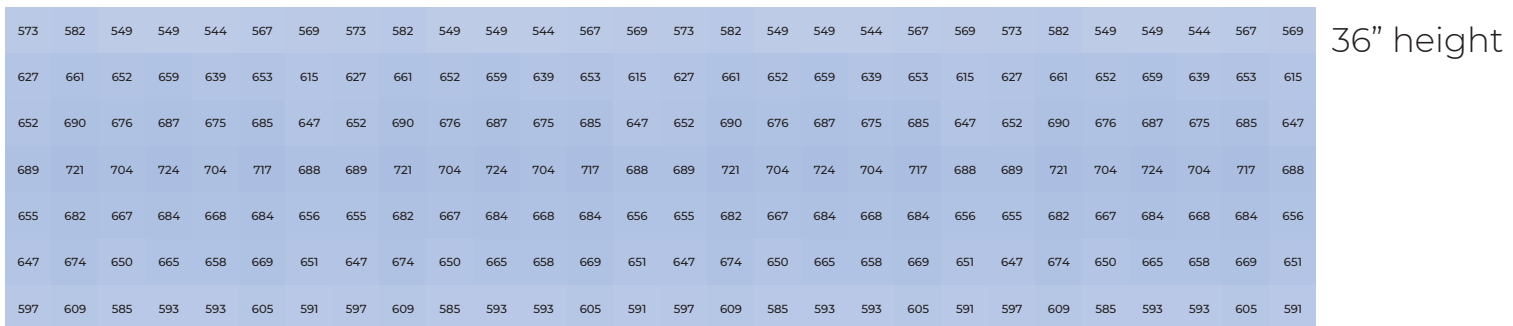
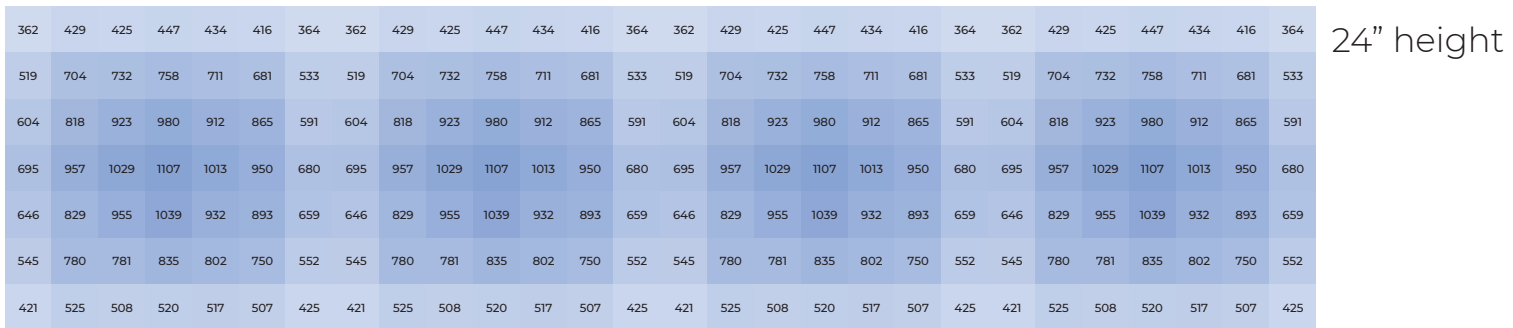
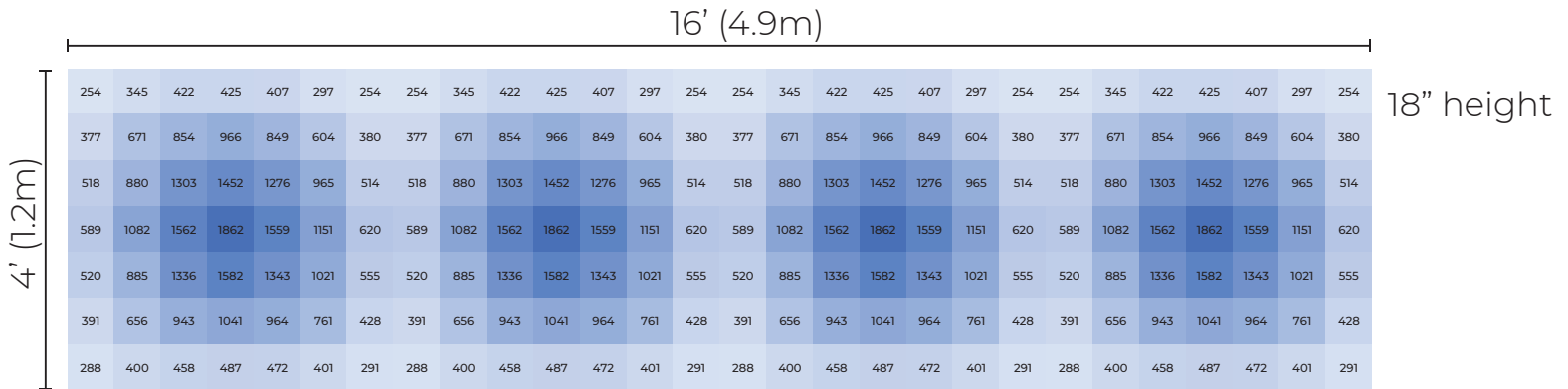


Linear Arrays - Multiple Rows

These PAR maps are based on an array of FluxScale fixtures arranged in rows, with 4' fixture to fixture spacing within row and 5.5' fixture spacing row to row. These PAR maps are most representative of 4' wide benches with 1.5' between each row of benches.

Test Conditions

Fixture: FluxScale 600TL	Precision PAR: Not configured
Version: 2.0	Engine Temperature: 38C
Installed Spectrum: -VF (vegetative & flower)	Wall plug power: 610W
Precision PAR: Not configured	Spectrum: Flowering (4000K white + deep red, 93CRI)
Reflector installed	Surroundings: open area, no walls

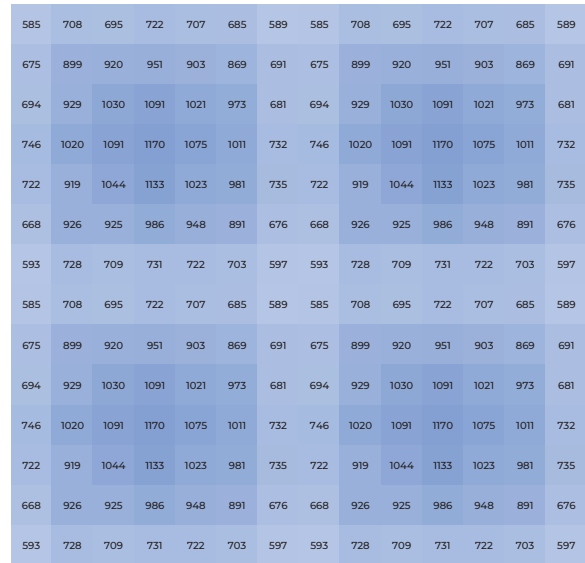
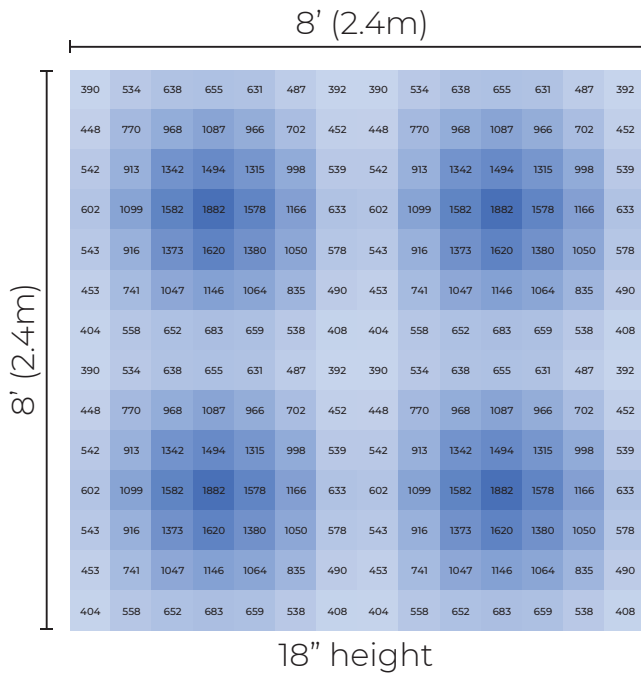


Square Arrays

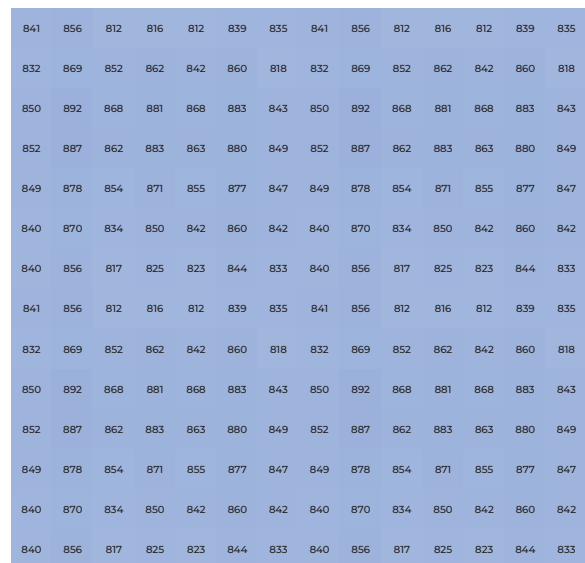
These PAR maps are based on square arrays of FluxScale fixtures spaced 4' apart.

Test Conditions

Fixture: FluxScale 600TL	Precision PAR: Not configured
Version: 2.0	Engine Temperature: 38C
Installed Spectrum: -VF (vegetative & flower)	Wall plug power: 610W
Precision PAR: Not configured	Spectrum: Flowering (4000K white + deep red, 93CRI)
Reflector installed	Surroundings: open area, no walls



24" height



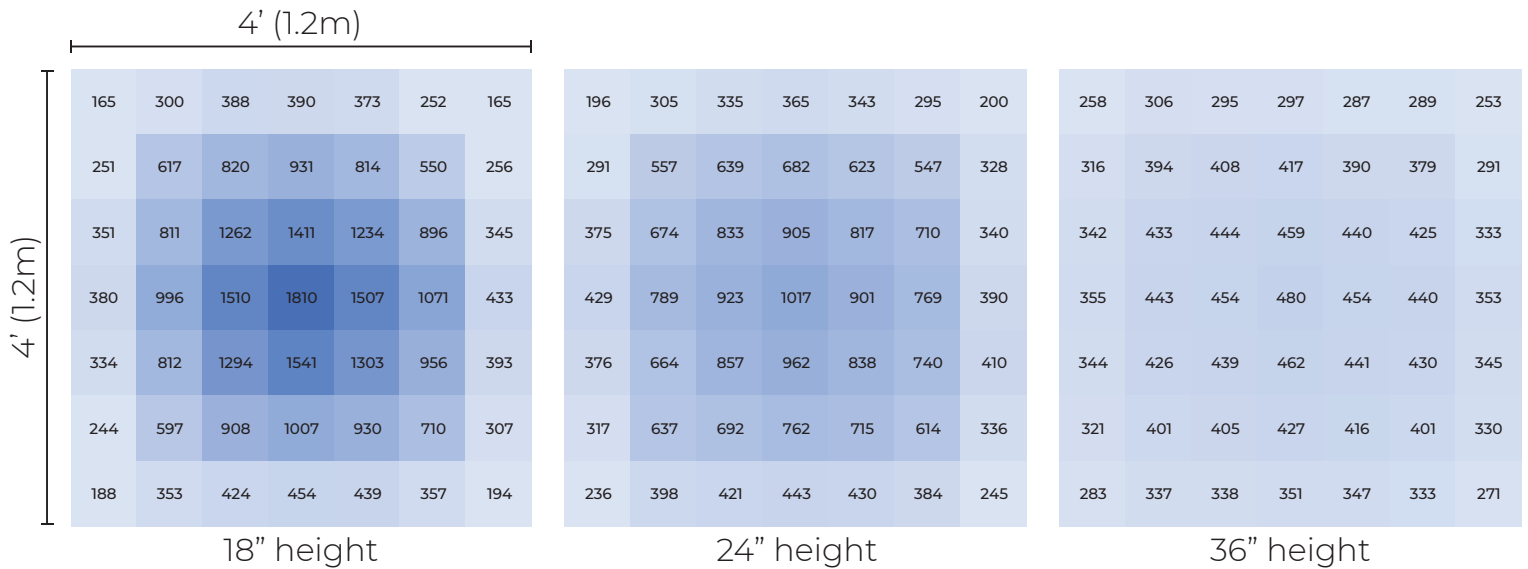
36" height

Single Fixture, with reflector, open surroundings

These PAR maps are based on a single fixture with reflector and open surroundings with no nearby walls.

Test Conditions

Fixture: FluxScale 600TL	Precision PAR: Not configured
Version: 2.0	Engine Temperature: 42C
Installed Spectrum: -VF (vegetative & flower)	Wall plug power: 610W
Precision PAR: Not configured	Spectrum: Flowering (4000K white + deep red, 93CRI)
Reflector installed	Surroundings: open area, no walls

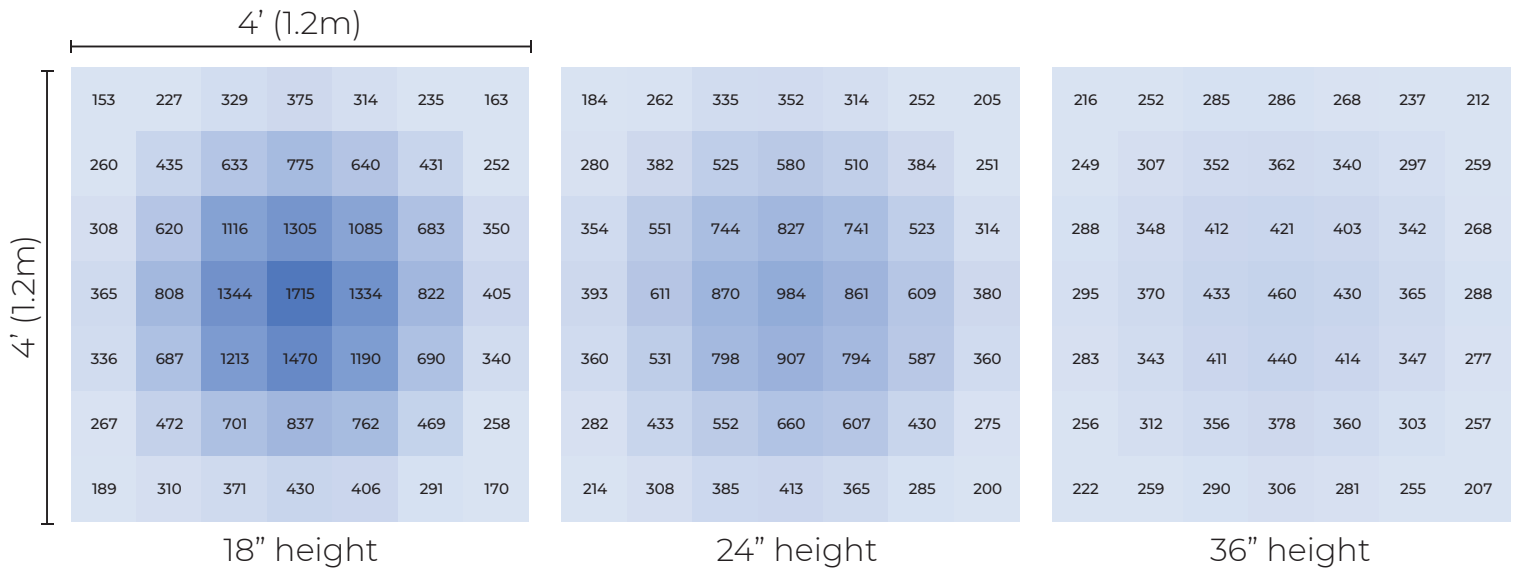


Single Fixture, no reflector, open surroundings

These PAR maps are based on a single fixture and open surroundings with no nearby walls.

Test Conditions

Fixture: FluxScale 600TL	Precision PAR: Not configured
Version: 2.0	Engine Temperature: 42C
Installed Spectrum: -VF (vegetative & flower)	Wall plug power: 610W
Precision PAR: Not configured	Spectrum: Flowering (4000K white + deep red, 93CRI)
No reflector	Surroundings: open area, no walls



Single Fixture, with reflector, inside tent

These PAR maps are based on a single fixture with reflector inside a reflective tent.

Test Conditions

Fixture: FluxScale 600TL	Precision PAR: Not configured
Version: 2.0	Engine Temperature: 42C
Installed Spectrum: -VF (vegetative & flower)	Wall plug power: 610W
Precision PAR: Not configured	Spectrum: Flowering (4000K white + deep red, 93CRI)
Reflector installed	Surroundings: reflective 4' x 4' tent

