Using the Spectroradiometer to Evaluate LED Lamps

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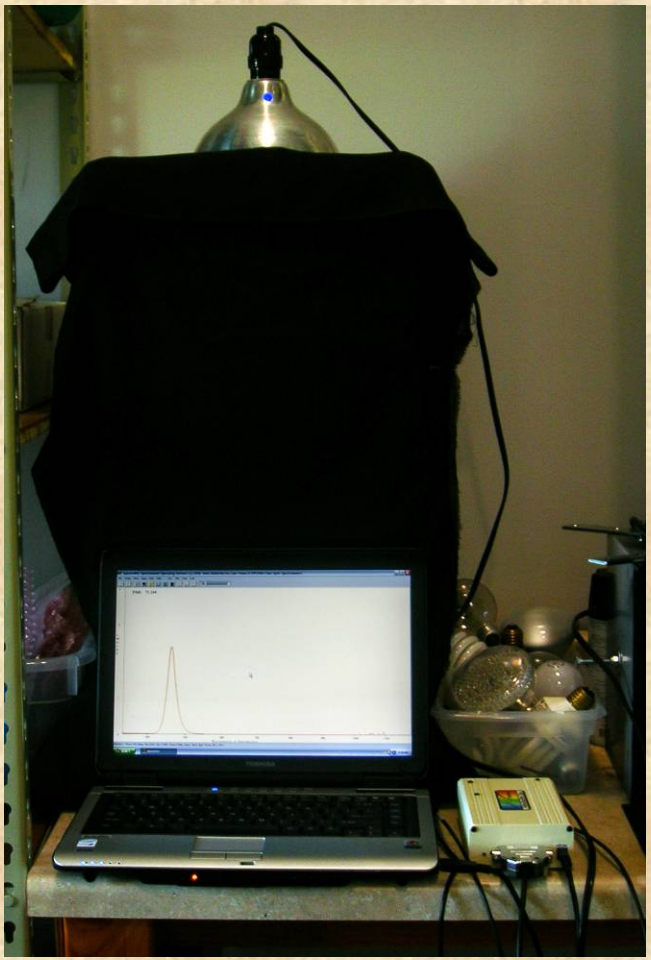
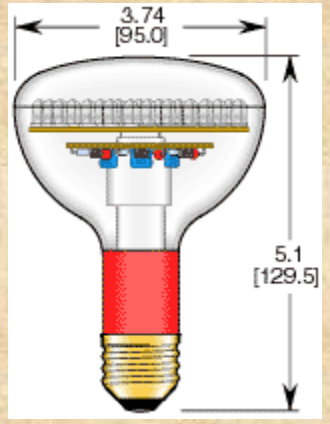
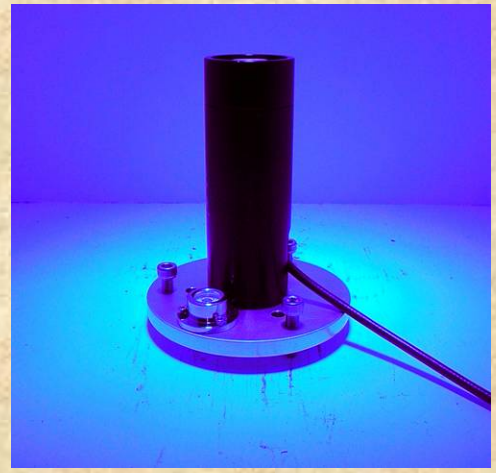


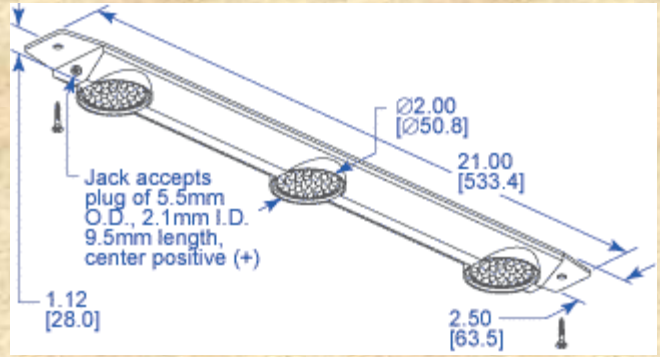
LED Lamps



Super Blue
Super Red
Infrared
Cool White
Warm White



Plant Bar



LEDTRONICS, INC.

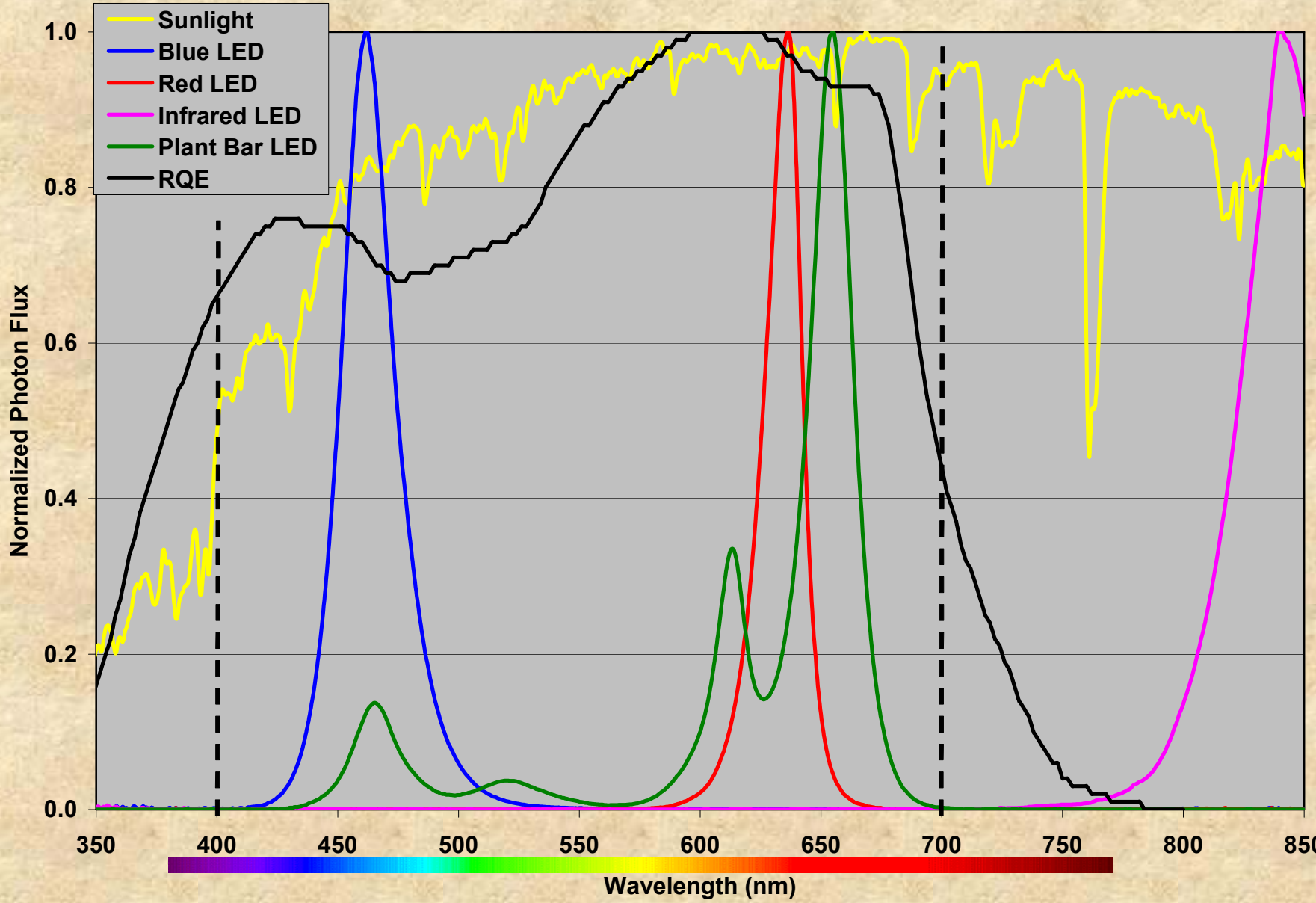
38 LEDs

Unit Price of LED Lamps

LED Lamp	Model Number	Unit Price*
Super Blue	R30-123-0PB-120AN	$119
Super Red	R30-123-0ER-120AN	$83
Infrared	R30-123-851-120AS	$129
Cool White	R30-123-0WW-120AS	$83
Warm White	R30-123-2IW-120AS	$83
Plant Bar	LED-PLANTBAR-001	$160
Compact FL	Various models	<$5

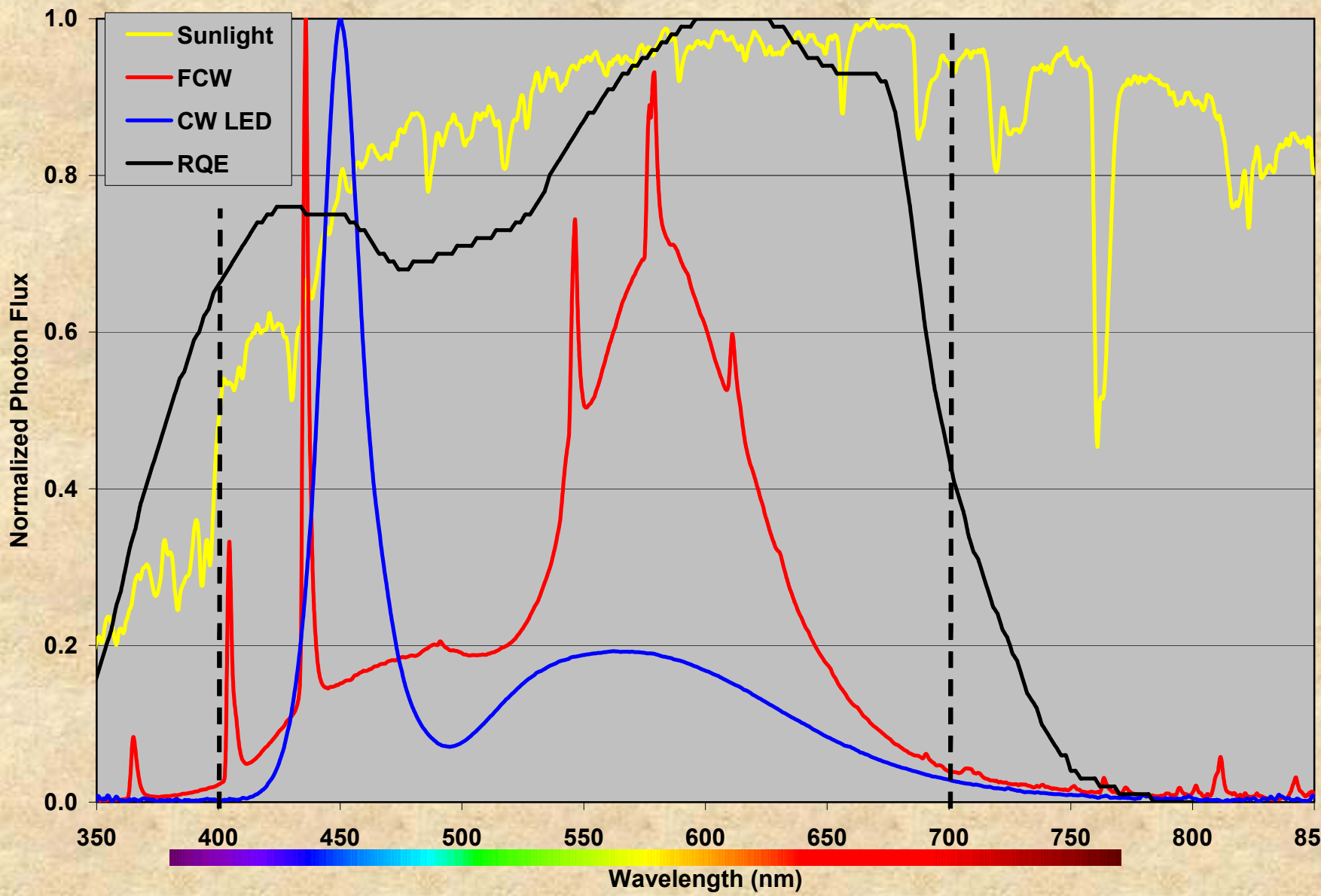
*** Excluding shipping; purchased as single units (no volume discount)**

‘Single’ Wavelength LED Lamps



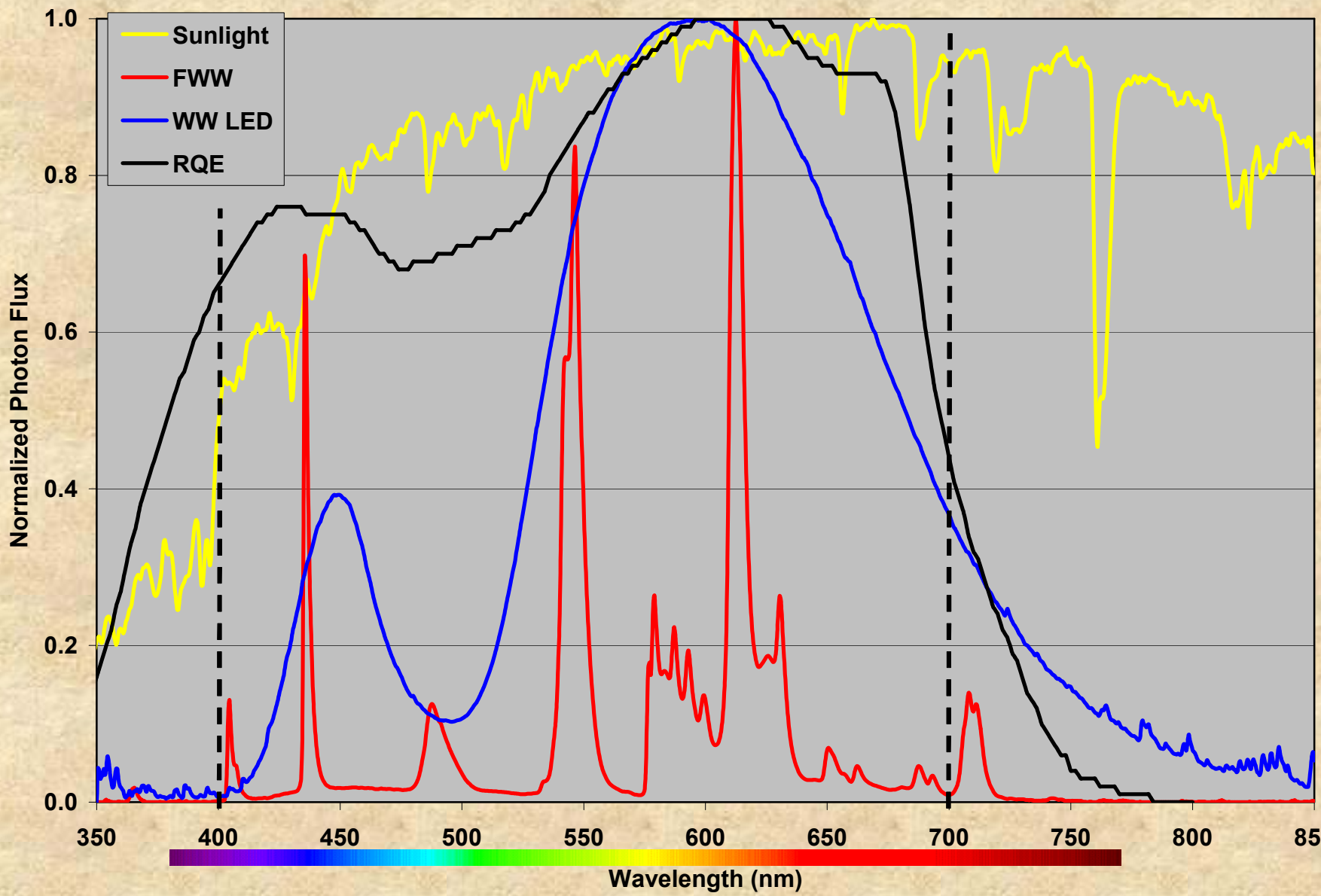
RQE: Relative Quantum Efficiency (McCree, 1972; Sager et al., 1988)

Comparing Cool White Lamps



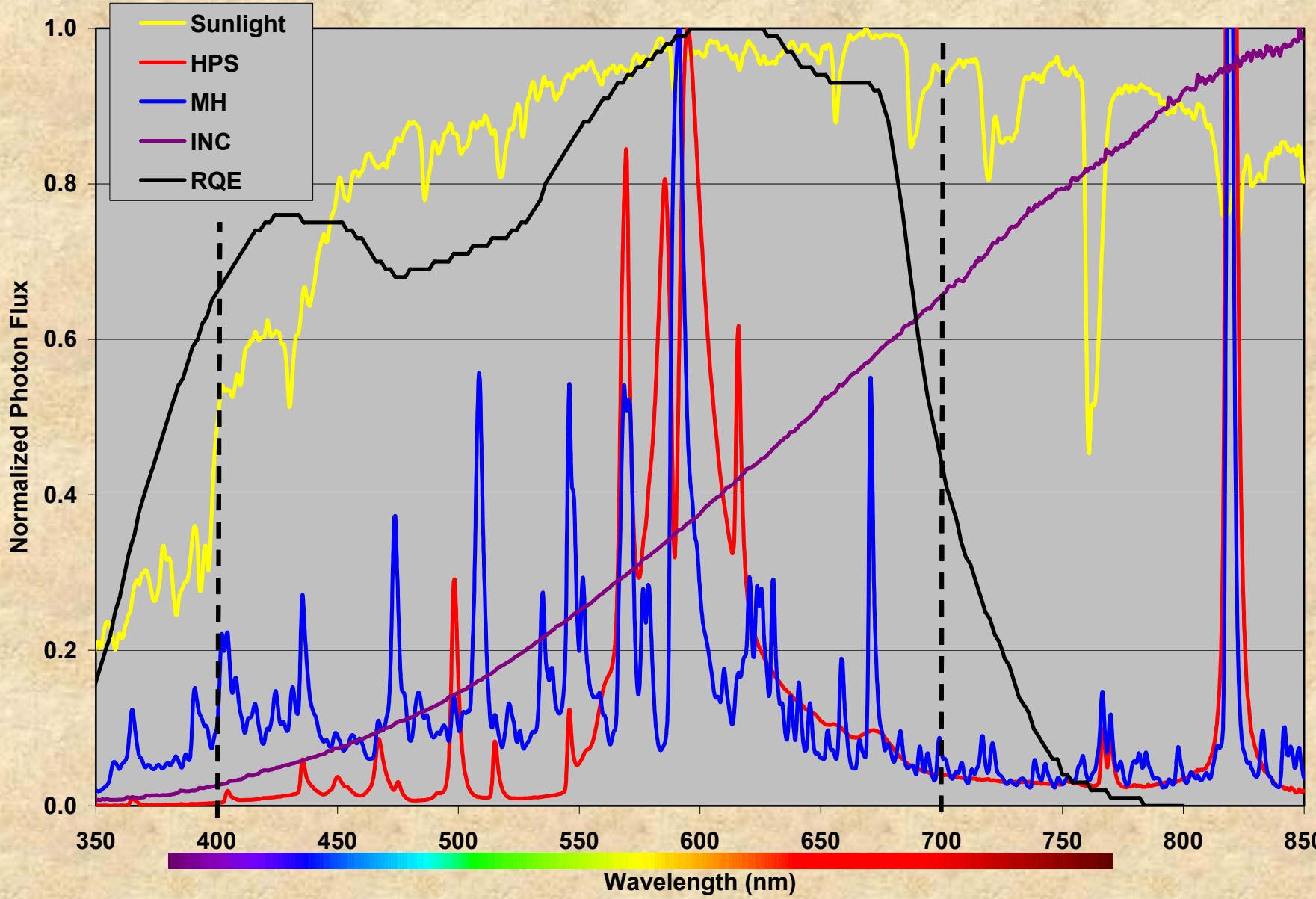
RQE: Relative Quantum Efficiency (McCree, 1972; Sager et al., 1988)

Comparing Warm White Lamps



RQE: Relative Quantum Efficiency (McCree, 1972; Sager et al., 1988)

Other Commonly Used Lamps



RQE: Relative Quantum Efficiency (McCree, 1972; Sager et al., 1988)

Spectral Efficiency

Spectral Efficiency = $\sum[(PF)_i * (RQE)_i]_{343\text{-}800} / \sum(PF)_{343\text{-}800}$

Common Lamps	Spectral Efficiency*	LED Lamps	Spectral Efficiency
HPS	0.89	Super Blue	0.72
MH	0.78	Super Red	0.98
INC	0.49	Cool White	0.80
FCW/ FWW CFL(SW)	0.86/0.87	Warm White	0.82
SUN	0.64	Plant Bar	0.92

*** Bugbee, 1994: PPF Correction Factor = $\sum[(PF)_i * (RQE)_i]_{360\text{-}760} / \sum(PAR)_{400\text{-}700}$**

LED Lamp Observations

- Build your own spectrum
- Low power consumption (10 Watt/Lamp)
- Long lamp life (50,000-100,000 hrs)
- High shock/vibration resistance
- Cool bulb surfaces
- Replacement for INC?

  - Possibly, but may need a source of far-red
- Replacement for FL?

  - Possibly, but light distribution may be an issue
- Plant Bar: similar applications as light engine (lightcicle) used by colleagues at Purdue?