



**Total lumen output isn't the only factor to consider when purchasing grow lights.**

Lumens are a unit of measurement used to quantify the light emitted by a light source. This measurement is weighted according to the sensitivity of the human eye.

Because the human eye is most sensitive to green light, when measuring the amount of light produced by a lamp in watts, the watts produced in the green portion of the spectrum will contribute much more to the number of lumens produced by that same lamp.

As an example, let's assume we have 3 different lamps that each produce only blue, green, or red light within a single wavelength each.

**Lamp A** produces 1 watt of light at 450nm (blue).

**Lamp B** produces 1 watt of light at 555nm (green).

**Lamp C** produces 1 watt of light at 650nm (red).

After converting the watts to lumens, here is the output of these same 3 lamps in lumens:

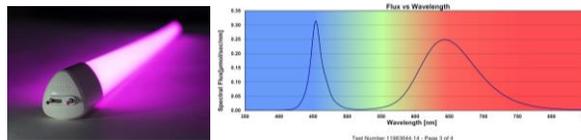
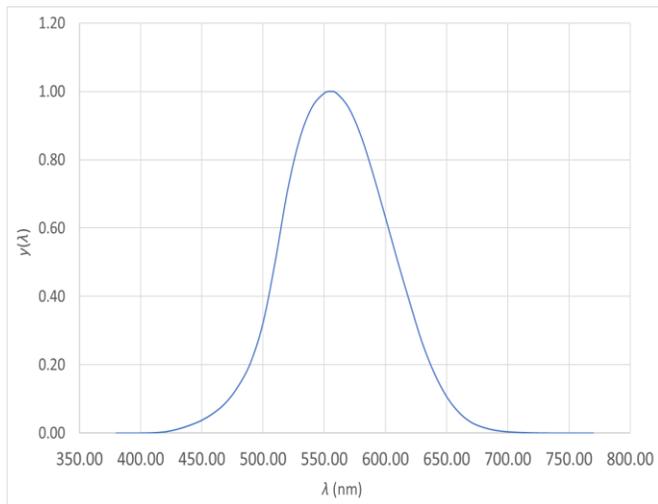
**Lamp A** produces about 26 lumens.

**Lamp B** produces about 683 lumens.

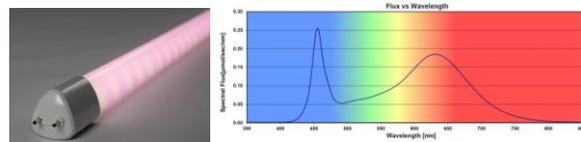
**Lamp C** produces about 73 lumens.

Plants do not share this same sensitivity to green light. Therefore, using lumens to evaluate light sources that likely have different spectrums will lead to misleading results and may not indicate how well the lamps will promote healthy plant growth. Certain functions of plants, such as the mechanism which drives photosynthesis, are most sensitive to red and blue light.

You can also see that through this weighting, any light produced below 400nm and above 700nm will be essentially insignificant when measured in lumens.



**Toggled Focused Spectrum (E416-G1310: 819lm, 1634K)**



**Toggled Full Spectrum (E416-G2310: 1548lm, 3912K)**

Research has shown that light produced in the far-red (700-800nm) and infrared (800-850nm) portions of the spectrum can be very beneficial for healthy plant growth. Toggled Gro lamps produce a significant amount of far-red light and even some infrared light which does not contribute to the light output when measured in lumens.

For the reasons above, we rate our grow products in micromoles per second ( $\mu\text{mol/s}$ ). The  $\mu\text{mol/s}$  is a measurement of the total number of photons (light particles) produced by the lamp (in moles) per second. This number can be directly correlated to the photosynthesis process and is much more representative of the plant growth promoting performance of a grow light.