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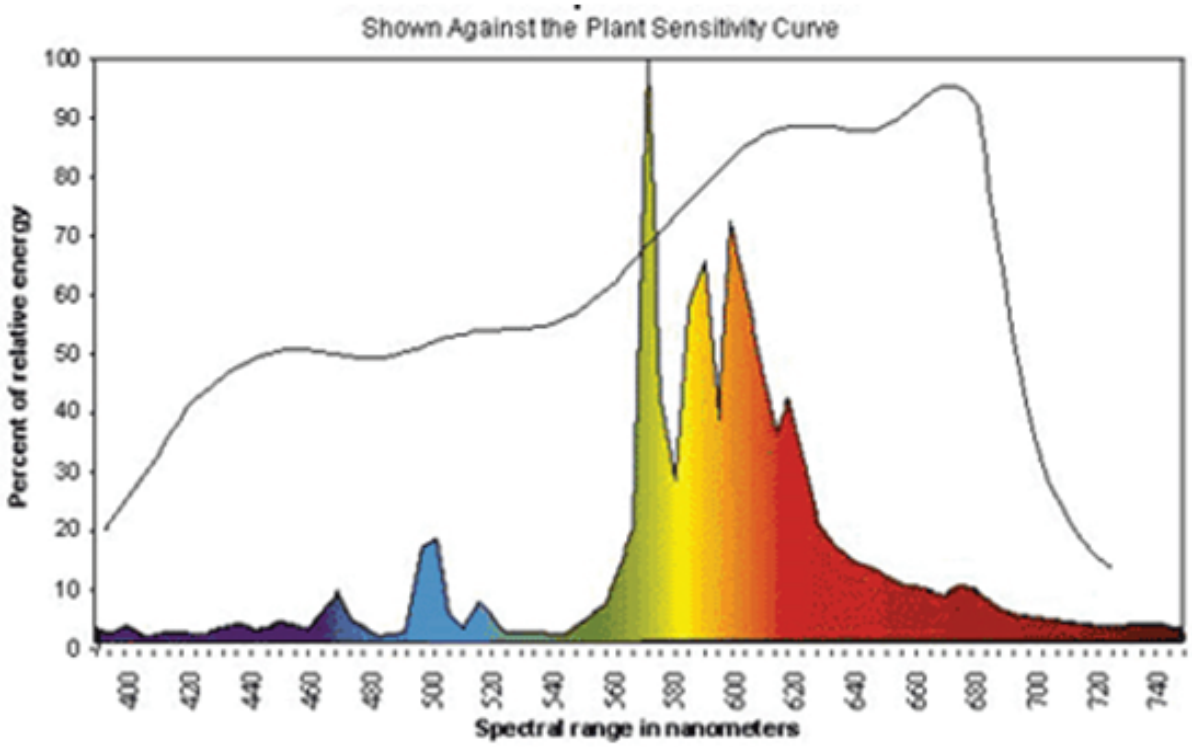
PAR Light & Nanometers in Horticulture

PAR light and Nanometers are commonly misunderstood in relation to horticulture. The basic concept with PAR light is that plants only really need the peaks of photosynthesis, or just the range of visible light that spans 400 and 700nm range (approx.)

Nanometers are a measurement that scientists made up to explain what they were seeing. The word nanometer literally refers to one billionth of a meter. Before that it was an Angstrom, and a millimicron, etc. In science, references for references are often found to be flawed.

Both of these terms (PAR and Nanometers) are man-made, and therefore subject to the knowledge and interpretation of those who made it. Plants just want what the Sun has provided them for millions of years, what they need for their life processes. Humans can't selectively break the light that shines on the Earth into just what falls into a visible range. There are portions of Sunlight that we don't see with our eyes, but that plants see and use in their own way – and they have no eyes.

The plant efficiency curve (seen below) was historically used in horticulture, but is really for the human eye more than it ever was for plants. People can't cherry-pick the light from the Sun and nature doesn't have two brick walls that say 400 and 700 nanometers.



The plant sensitivity curve (L) represents the traditional basis for PAR light. The idea is that peaks of red and blues are enough for proper plant development.

Plants want the Sun. Plants use all the light that they get from the Sun to make chlorophyll a and b, and provide the electron volts to the light harvesting complexes in the leaf.

(Known as Photosystem 1 and Photosystem 2)

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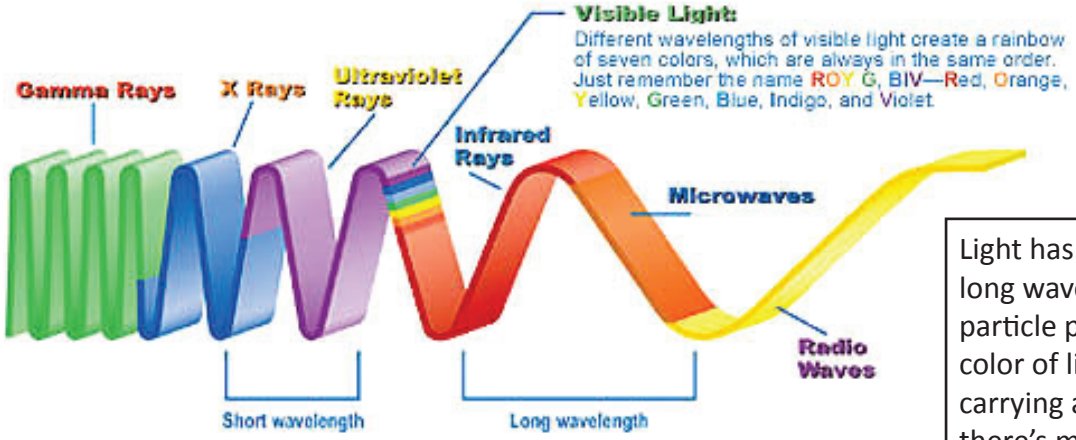
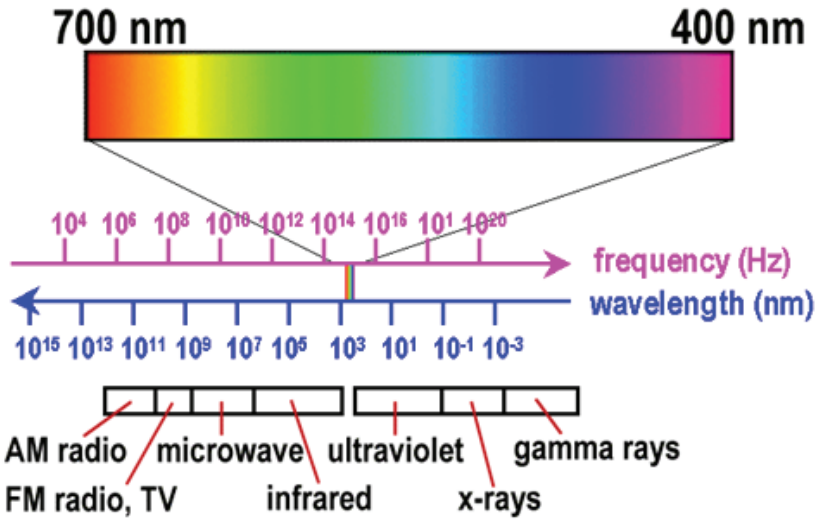
Light is a complex subject; light, light delivery, spectrum, frequency, and then the photobiology, plant science, quantum physics and more. The complexities of these disciplines only permit short explanation in a single white paper. Plants want the Sun, but the Sun is twice the energy they need for maximum photosynthesis. Too much light, too much heat, and too much humidity all inhibit the photosynthetic process (Known as photo-inhibition).



Light has properties of wavelengths, and long wavelengths – wave physics and particle physics are a part of that. Each color of light travels at its own speed, each carrying a certain number of electron volts; there's more than one speed of light. Plants want all the colors all the time.

The relationship between frequency and wavelength are inversely related. The Sun is shining with full spectrum light, at a specific frequency. Higher frequency electronics produce light that's closer to the Sun, but that man can't perfectly replicate. The Sun shines in space in the Penta and Terra Hertz, but not all that is received on the Earth.



PAR light is an expression for the visible spectrum, but is no reference for what plants what. Plants just care about the incident energy, the electron volts, that can actually be delivered to the leaf, that the plant can actually assimilate for photosynthesis. Photosynthesis, for example, will stop on the leaf surface when Sunlight levels reach approx. 6500 FC. More light isn't always better. The Sun puts out approx. 10,000 FC; twice what they require for maximum photosynthesis. Plants have just adapted to those excess levels of natural Sunlight, to become the plants we see in Nature now.

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