

Light\_And\_Growing\_Spectrum\_1999.txt

Sent: may 99

A new type of long persistence phosphorescent pigments.

<http://www.gtamart.com/mart/products/phspgmnt/pigments.htm>

Thought of another use for this type of product. If hunting arrows and spears were painted with a bit of this it could make them easier to find in the dark after PS. Even phosphorescent tape would work. One could shine a strong light in the area, then by tuning off the light the arrow or spear would glow to indicate it's location.

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Diode Lasers

<http://www.repairfaq.org/sam/laserdio.htm>

The Brightest and Most Efficient LEDs and where to get them!

<http://www.netaxs.com/people/klipstei/led.html>

Don Klipstein's Lighting Info Site!

<http://www.netaxs.com/people/klipstei/light.html>

Don Klipstein's Web Site!

<http://www.netaxs.com/people/klipstei/index.html>  
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Subject: Fish tanks

Sent 5 may 99

The Krib <http://www.thekrib.com/> has a wealth of practical information about fish and how to maintain them, along with data on growing aquatic plants, retarding the growth of algae, plumbing, lights, and fish tanks. Has lots of data to a great depth from many contributors over the last 5 years. Will take some time to digest this.

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Subject: Lighting  
Sent 5 may 99

Here you will find a wealth of practical information on many types of lighting methods ranging from the common to the obscure, as well as comparisons of their effectiveness.

<http://www.thekrib.com/Lights/>

Plant Tech: Lighting, meters  
<http://www.thekrib.com/Plants/Tech/intensorama.html>

Light in PAR discribed or defined.  
<http://www.thekrib.com/Plants/Tech/intensorama.html>

Plant chlorophyll absorbs light at wavelengths of 400 to 700 nm. This is termed Photosynthetically Active Radiation (PAR)" - Huebert.

Pete Mohan wrote: "PAR is expressed in microeinsteins per second per square meter. ( $\mu\text{mol}/\text{m}^2/\text{s}$ )

For each lamp,  $1 \text{ uE} = X \text{ ftc}$ . Use these conversion estimates to compare the PAR output of various lamps. This is the light actually produced, not just what people see.

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Subject: Spectrum and light for plant growth  
Sent 5 may 99

The following are selected quotes indicating what effects light color (spectrum)

and quantity of light have on plant growth.

Spectrum and plant growth:

<http://www.thekrib.com/Plants/Tech/lighting.html#13>

Terrestrial plants are extremely sensitive to the red/far-red ratio (called the zeta ratio). Changes in the zeta ratio can completely alter the structure and growth of plants. Aquatic plants, however, are likely far less sensitive to the zeta ratio because of the rapid and variable attenuation of light in fresh waters.

Darkness period and plant flowering

<http://www.thekrib.com/Plants/Tech/lighting.html#25>

The distinction between describing a plant as a short day plant or a long night plant is not important as long as the plant is on a 24 hour cycle. If it gets short days, it will automatically get long nights. The distinction was made because it was found that plants measure the night length, not the day length. There is a pigment in plants called phytochrome that exists in two forms, phytochrome red (P660) and phytochrome far red (P700). Plants begin their nights with most of the pigment in the P700 form, which slowly converts to P660 during the night. The amount converted is the measure of the night length.

P660 absorbs red light, with a peak absorbance at a wavelength of 660 micrometers. When P660 absorbs red light, it converts to P700. P700 absorbs far red light, with a peak absorbance at 700 micrometers. When P700 absorbs far red light, it converts back to P660. Daylight has a lot more red light than far red light, and that is why the plant starts off its night with mostly P700, the form that slowly reverts to P660. A short day (long night) plant needs a long night to accumulate enough P660 to trigger the hormonal sequence that leads to blooming. If the night is too short, P660 does not build up to high enough levels to trigger blooming. The two phytochromes are quite sensitive to light, and even room lighting has enough red light to keep the 'clock' from running, i.e., keep any P660 from building up. Even the relatively dim light from street lights has enough red light to slow down the clock and give plants the "misinformation" that the night is a lot shorter than it really is. Every

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November I see weeds growing near street lights that delayed blooming and got killed by the frosts while still in the vegetative state. Further away from the lights, the weeds have gone to seed in plenty of time.

Steve Pushiak mentioned on Jan. 22 that his Ocelot sword bloomed after he had been on vacation for a week. While the house was unoccupied, there were no room lights on after dark to prevent the clock from running, and the plant got the long nights required for blooming. Room light strong enough to keep the clock from running is not strong enough for any meaningful photosynthesis.

"Normal" light that plants are likely to encounter has much more red than far red light, and so the effect is always to reset the clock to the point where nearly all the phytochrome is in the P700 form. With just a brief flash of red light in the middle of a long night, the clock will be reset, and the plant starts counting from the beginning. With a special filter that only allows far red light through, it is possible, with a flash of far red light, to run the clock to the end and create the effect of a long night.

Paul Krombholz,

Light intensity, spectrum, etc:

<http://www.thekrib.com/Plants/Tech/lighting.html#21>

I did say that blue light promotes shorter, bushier growth, while red light promotes taller, lankier growth. This wasn't an original statement on my part though, it's pretty well documented in horticultural literature. I didn't say anything about leaf size. The trouble is that people have taken the above statement to mean that you can (should?) emphasize one end of the spectrum over the other. What I was trying to get across (and obviously failed, since this has come up numerous times<g>) is that with our present knowledge or lack thereof, it would seem prudent to provide good balanced coverage at both ends of the spectrum.

As far as long internodes and small leaves, in my experience, this is most likely a sign of inadequate intensity, rather than the "wrong" spectrum, what

ever that is.

Karen Randall - Aquatic Gardeners Association

Fluorescent Bulbs used for aquatic plant growth:

<http://www.thekrib.com/Plants/Tech/lighting.html#18>

Light requirement is sometimes expressed by the fairly awful measure watts per gallon. At less than 1 watt per gallon you are restricted to only a few kinds of plants with low light requirements. 2 watts per gallon will grow most common plants. For plants with high light requirements or really heavy planting where the plants seriously shade each other, you should have 3-4 watts per gallon.

I hope this helps. The whole business of lighting and planted tanks is very much a 90/10 thing - you can get 90% of the results with 10% of the time/money/trouble, and the other 10% requires the other 90%. So don't be afraid to start out with a simple and cheap set up and only upgrade if you can't get satisfactory results.