

Aquarium Lighting Basics

Presented by Rick Dotson



Greater Washington Aquatic Plants Association

www.gwapa.org

Introduction

- Rick Dotson – longtime hobbyist who has killed a lot of plants
- Goal - Since lights can run \$250 or \$300 or more we will discuss factors to consider when buying a light

Honest, I didn't mean to kill those plants!



Lighting is the easiest of the limiting factors to control.

Two lighting variables that are under your control:

- How long to leave the lights on.
- How much light actually gets into your tank.



How long should the lights be on?

- Plants only photosynthesis light for a short period of the day. Any longer lighting period results in algae.
- 9 out of 10 hobbyist agree that about 10 to 12 hrs a day is about right*
- A timer is essential. This is an indispensable piece of equipment.
- So it seems the only lighting factor really under your control is how much light.



* as reported by the American Dental Society

Do I have enough light?

- Light is like money. If you have to ask you don't have enough. Seriously though, no standard aquarium setup comes with a light out of the box, that is actually able to grow most plants.*



*Rex's Guide to Planted Tanks -
<http://www.theplantedtankfaq.com/lightingFAQ.html>

How is light measured?

- Lumens are a measure of the perceived power of light.
- Watts are a measure of energy
Watts are also used to compare energy used by devices
- A lux meter is used to measure light for a given area
 $1 \text{ Lux} = 1 \text{ lumen per square meter}$



Let's discuss how much light is output by different types of fixtures.

3 – 5 watts per gallon?
Watts per gallon or lumens per watt??

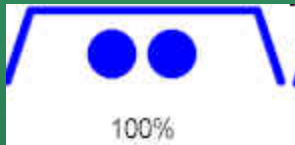
COMPARISON OF WATTS, LUMENS AND COST

Type	T5 HO Fluorescent	T8 Standard	T12 Standard	Compact Fluorescent	Metal Halide
Watts	216W 4-54 Watt T5 bulbs	256W 8 -32W T8	400W 10- 40W T12	390w - 6 - 65w	1 - 250W
Lumens	20,000 Lumens - 5,000 lumens per bulb.	16,128 Lumens 2,016 per bulb	22,000 Lumens- 2200 lumens per bulb	25,350 Lumens 4225 per bulb	20,000 lumens per bulb
Lumens per Watt	92.6	63	55	65	80
CRI	85 CRI	75-85 CRI	62CRI	80 CRI	65-92CRI
Cost	\$299	??	5 x \$125	3 x \$109	\$339



Getting the most out of your lights

Things that reduce the light getting to your plants

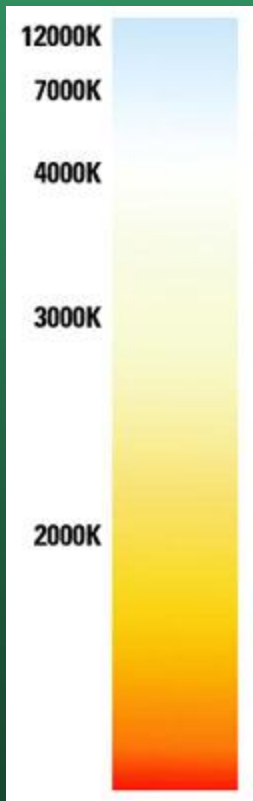


- Cheap reflectors – tubes are round
- Dirty covers or bulbs
- Floating or untrimmed plants
- Depth of tank
 - ◆ light reduces exponentially though water but not enough in 24" to make a difference. Plants absorb light that would otherwise reflect to lower parts of the tank.



The Color of Light

- Color or temperature of light bulbs - usually expressed as kelvins
- 5500K - 6500K is good for aquatic plants
 - ◆ Most incandescent bulbs - 2856K
 - ◆ Warm white – 2950K
 - ◆ Cool white – around 4100K
 - ◆ Daylight – 5500K
- Red light encourages long, “leggy” growth, while blue light encourages compact, “bushy” growth.
- Actinic bulbs (12000K) not used for plants – but included with many fixtures



Real Life Experience



Because aquascaping is not an exact science here are a few example of our member's setups and the lights they use.

Comparing Lighting Options

- Incandescent – use Compact PC in these hoods
- Power Compact Fluorescent – excellent
- T12 – big & older but common and inexpensive
 - T5 HO Fluorescent – excellent
 - Metal halide – good light, expensive bulbs, run very hot
 - Mercury Vapor – used in street lights – poor color, not recommended
 - VHO – older, bulbs need to be replaced frequently, very hot, not recommended
 - LED – expensive, directional light, last 11yrs



DIY Projects

- Shop Light Overdrive
<http://gwapa.org/wordpress/articles/overdriven-normal-outputodno-lights/>
- Strip Light Retrofits – PC and T5 HO
- LED Strip Retrofits



kits available from ahsupply.com and hellolights.com



LED – Lights of the future?

- Run much cooler than standard fluorescents and metal halides
- Consume less energy
- Much longer bulb life span
- Small bulb size allows unlimited configuration options
- Rectangular layout provides more even light distribution



Conclusions

While there are some aquarium plants that will grow under just about any type of light, if you want to grow specific plants consider the light that you will use.



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Empty Aquarium?

