Advice and Cautions on Lighting for your Orchids

The following are notes from Andrew (Sandy) Buchanan's presentation to the Ottawa Orchid Society on Lighting in November, as recorded by Jan Johns and approved by Andrew.

The types of lights available are changing rapidly. When looking on the internet, be aware of false claims and studies. Many are biased and the studies are not performed well. The following factors should be considered for lighting.

Intensity: measured in foot candles or lumens – the amount of light

- You want the greatest light intensity at the plant itself. A bulb may produce a lot of light close to the bulb, but if it is far from the plant, or at an angle from the plant, the intensity will be less at the plant itself.
- If the bulb also produces heat, you will have to keep the bulb further from the plant… which will reduce the intensity. The ideal bulbs are cool.
- You also want even lighting for an area. Wrapping the table with Mylar to reflect the light can help with this.

Plant Light Requirements	**Measurement on Light Meter** (Foot candles)
High	3000
Medium	2000
Low	1000 to 1500

Intensity is important, but not overly informative. It does not give information on the intensity at the frequency required. For plants, a PAR rating is used that measures the flux for the photosynthetic range.

Spectrum or colour of light - PAR

- Lighting for us to see colours well requires a good CRI (Colour Rendering Index). This ensures that the colours we see are true. The best CRI is comparable to daylight. Incandescent light provides a full visible spectrum (remember ROYGBIV), but produces mostly heat, not light.
- Lighting for plants is different. Plants require a good PAR (Photosynthetically Active Radiation) between wavelengths of 400-700 nanometers (nm) that provides the colours needed for photosynthesis. Key light for plants is in the blue (450 nm) and red (600 nm) regions of the spectrum.

Colour Temperature (which has nothing to do with the heat produced by the bulb)

- The colour of the light is given as a temperature value, K. This is the temperature a black body would have to be to produce that colour. But as these bulbs are not black bodies, they don't actually get to these temperatures. It is just used as a scale for colour of light.
- Higher numbers radiate in the blue region (5000 K and over); lower numbers radiate in the red region (2700-3000 K). Sunlight provides the full spectrum, but grow lights will provide light over a narrower spectral region: 6400 K, 5400 K, 3000 K and others.
- The higher colour temperatures are good for growth (in the blue region), while the lower temperatures (in the red) promote flowering. A combination of these will provide a healthy light spectrum for orchids.
- Newer LED bulbs can be programmed (at a cost) to program the spectrum to reproduce natural daylight as the sun rises and sets over time.

Energy, Efficiency and Stability

- Energy is measured in Watts (W). Efficiency is often measured in lumens/W – that is the light output per unit of energy input. You want the most light for the least energy, so the higher the lumens/W, the lower your energy bill will be. Energy efficiency is the driving force for the development of light technologies.
- In addition to efficiency, the stability of bulbs is also important. Many bulbs decrease light output over their lifetime. Sometimes bulbs must be replaced before the end of their lifetime to keep the intensity in the productive range.

The tables below summarize information about the current grow bulbs discussed at the meeting. Andrew feels that right now, tubular fluorescent lighting (T5) with a combination of red (3000 K) and blue bulbs (6500 K) is still the most economical for home hobby growers. Bulbs should be replaced yearly. This may change if marijuana becomes legal. The pot market is worth a lot of money and will drive technological advances, availability and thus cost of home growing equipment. Some of the best information on indoor grow set ups are on sites dedicated to this "weedy" plant.

Picture of our speaker Andrew Buchanan supplied by himself. He says it's his best side!

If you want any further information from the experts, be sure to contact Andrew (andrew@buchananlighting.ca) or drop in at Buchanan Lighting Ltd., 129 Loretta Ave. N, Ottawa ON, K1Y 2J7: Phone 613-728-3551

Type of Bulb and Technology	Description/Information	Comparable Lifetime (hr)	Stability (percentage of lumens lost over time)
Fluorescent - older technology	Tube Sizes: T-5, T-8. T-12 T-12 (larger) is being phased out. T-5 is the best value. CFL – Compacts can be used with reflectors.	20,000	after 100 hours 20-25% lumens lost – replace yearly
HID: HPS - older technology	High Intensity Discharge High Pressure Sodium	15 - 20,000	after 10,000 hours 40% of lumens lost
HID: MH and CMH – newer technology	Metal Halide Ceramic Metal Halides	10 – 20,000	
LED - newer technology	Light Emitting Diode	35-50,000	most stable throughout lifetime
Induction - newest/oldest technology	Developed by Tesla (1891), now being used in the market due to its efficiency	100,000	over lifetime 20% lumens lost

Type of Bulb	Efficiency	Approximate Cost for a 4' x 4' set up	Heat production	Colour (PAR)
Fluorescent	good	$220	cool	blue 6500 K; red 3000 K; and a mid-range 5400 K
HID: HPS	least	$300-350	hot	mostly red - used as supplemental light to daylight
HID: MH/CMH	good			7000 K and 3000 K
LED	best	$800	cool	You can get specific range of wavelengths (good PAR) and control them at a price, $2000.
Induction	better	$1100	cool	similar to fluorescent for PAR

OOS ORCHID CALENDAR—GOING, GOING….

Please note our supply is quickly running out. December may be the last chance to get your 2016 calendar featuring OOS prize-winning plants, all grown by our members. Only $20 each. A good present for an orchid-growing friend or for just anyone who loves flowers!! Calendars will be available at the member's table at the December meeting.