Grow Lighting Quality & Quantity

Light is a very important factor for growing. Ensuring that our plants have sufficient light, and the correct type of light is key to producing the best crops we can. The quality of grow lighting used is just as important as the quantity. The portion of light spectrum that plants are sensitive to is referred to as photosynthetically active radiation or PAR which ranges from about 400-700 nanometers in wavelength. As seen in the photosynthetic response graph below, plants respond more effectively to red and blue light. The peak being in the red region around 630 nanometers. Red light provides the most efficient food for plants. But, a plant receiving light with only a red/orange spectrum will fail to fully develop. Healthy, vegetative growth requires light from the blue range as well. The best situation is to have a quality light which is capable of providing all of the light necessary for healthy growth, balanced both in red and blue portions of the light spectrum. The spectrum of light predominantly emitted from bulbs are generalized with correlated color temperature, measured in Kelvin. Red bulbs being around 2000 Kelvin, and blue bulbs around 3200 Kelvin and above.

Plants receiving insufficient light will produce smaller, spindly growth and have an overall lower yield. While plants receiving too much light can dry up, wither, and become bleached due to the destruction of chlorophyll. However, if kept within an acceptable range and provided with the correct spectrum, plants will respond very well to light with their rate of growth being proportional to light levels. In addition to photosynthesis, which is responsible for plant growth, there are other plant actions such as germination and flowering which are triggered by the presence, or absence of light regardless of intensity. The amount of time the plant receives light is called photoperiod. Annual flowering plants generally vegetate under longer photoperiods, 18 hours of light or more per day. While flowering will occur during shorter photoperiods, 12 hours of light per day. Interruptions or inconsistencies can cause symptoms of stress such as prolonged flowering time, and in some cases intersexual growth traits.

Grow Lighting Technology

Grow lighting technology is advancing every day. So which is best, and for what? Below is a brief explanation of the different lighting technologies most commonly utilized in indoor grow applications.

HPS: High Pressure Sodium Lighting

Coupled with very high lumen output and a red/orange dominated light spectrum, HPS bulbs are considered the industry standard for flowering. While cheaper bulbs may start out burning bright and providing good growth, their spectrum is limited and consistency after 3-6 months is highly questionable. A quality HPS will burn at around 2000-3000 kelvin, and have a 9-12 month life expectancy when used for 12 hours per day, (4000 hours of usage) and contain a broad spectrum capable of delivering not just red light but a decent amount of blue light as well.

Double Ended Lighting

The newest in HPS technology, DE bulbs are making a huge splash in the industry. The first benefit of the DE lamp is the extended life of the lamp, with a claimed 90% lumen maintenance at 10,000 hours. A standard lamp could be at that same point at 4000 hours. The second benefit is the increased PAR value in the light emitted. Being that the arc tube is housed in quartz glass, an increased amount of UV content in the lamp results in improved essential oil production.

Metal Halide Lighting

MH bulbs emit light that's most strong at the blue end of the light spectrum. A high quality MH bulb will burn at about 6000 Kelvin and helps produce compact, lush, green growth and should be monitored for maintenance after 6-10 months depending on whether used for 18 hours to 24 hours per day. Cheaper MH bulbs can appear a white-green in color, produce growth that is not as compact as desired, and have an expected life of 3-6 months.

Plasma Lighting

One of the newest innovations in lighting technology with low wattage consumption and high PAR output. LEP is completely solid state, with no moving parts and is suitable for damp environments. LEP technology is unique in how molecules in an emitter transform into a plasma state when excited by a radio frequency driver. This system doesn't require electrodes or a filament, which means a very long bulb life expectancy (50,000 hours). LEP lights emit a light color of light around 5600 Kelvin and provide a sun-like spectrum which is considered to be the best light to grow the highest quality produce.

Ceramic Metal Halide Lighting

LEC is a relatively new iteration of a classic metal halide. The superiority lies in the ceramic tube which allows the bulb to burn at a higher temperature, creating an amazing spectrum of light that is much closer to light from the sun. Philips 315 bulbs have two color temperatures. The 3100 Kelvin is great for flowering and a broad spectrum balanced well in both red and blue hues, and a 4200 Kelvin which is concentrated in the blue spectrum.

LED Lighting

LED fixtures use optics to achieve a narrow distribution of light, with the majority of light falling in a concentrated pattern directly below the fixture. This type of light pattern is ideal in settings with widely spaced plant rows where light lost between rows should be minimal. The most electrically efficient colors of LEDs are blue, red, and cool white. LED fixtures generally come in combinations of these colors in order to dose specific wavelengths of light to control aspects of plant growth. While the future outlook for LED usage in plant growth scenarios is promising, current available fixtures are not cost efficient when compared to traditional HID lighting.

Fluorescent Lighting

Having a very low profile, low heat output, and low wattage consumption makes these ideal for seedlings, cuttings and young vegetating plants. Typically these systems are customizable with different bulb lengths and varying numbers of bulbs per fixture. Allowing for the adequate illumination of areas as small as 2' x 2' to as large as 4' x 4'. Fluorescent lights are available in both 3000 Kelvin and 6400 Kelvin, allowing for a good mix of both red and blue light spectrums.