FAQ — HORTICULTURAL LIGHTING

General Lighting questions:

1) **What is HID Lighting?**
HID lighting stands for High Intensity Discharge, which is a special type of lighting that is much more intense (brighter) than other type of lighting available. An HID lighting system consists of a ballast, reflector, socket and lamp (light bulb). The ballast acts like the engine, converting and driving energy to illuminate the lamp. HID lighting options include High Pressure Sodium (HPS), Metal Halide (MH), Mercury Vapor and Low Pressure Sodium. The two typically used for plant growth are HPS and MH systems.

2) **What is Color Rendering Index (CRI), Color Temperature (K) and Lumen?**
Color Rendering Index is a subjective measurement of how well a lamp source renders colors. A measurement of the degree of color-shift an object undergoes when illuminated by a light source when compared to a reference source of comparable color temperature. Incandescent light is assumed to have a CRI of around 100 so it will render all colors correctly. MH only has a CRI of about 70, so only 70% of colors will be rendered correctly. HPS has a CRI of 22.

Color Temperature is not how hot the lamp is. Color temperature is the relative whiteness of a piece of tungsten steel heated to that temperature in degrees Kelvin. HPS has a warm (red) color temperature of around 2700K as compared to MH at 4200K, which has a cool (blue) color temperature.

What is important to remember about these two terms is that CRI readings, of two sources, can only be compared if their color temperature is equal. You cannot compare the CRI of HPS (CRI=22) vs. Metal Halide (CRI=70) because the color temperatures are different (2200K vs. 4500K)

Lumen is a measurement of light output. It refers to the amount of light emitted by one candle that falls on one square foot of surface located at a distance of one foot from the candle. Traditionally, lumens have been the benchmark of a lamps ability to grow plants; meaning the brighter the lamp the better the plant. However, studies have shown that a broader color spectrum lamp will perform much better than a lamp with high lumen output, especially when it comes to plant growth.

3) **What is the difference between MH and HPS with regards to plant growth?**
MH lamps provide more of the blue/green spectrum, which is ideal for leafy crops, and/or plants that are in a vegetative (actively growing) stage. MH lamps provide a more natural appearance in color and are typically the choice for plants that have little to no natural light available. HPS lamps provide more yellow/orange/red spectrum, which is ideal for most plants that are actively fruiting and flowering. In addition, HPS lighting is the choice for growers looking to supplement natural sunlight. Ideally, the horticulturalist will use MH to grow their plants and HPS to fruit and flower their plants.

4) **What is the difference between HID and Fluorescent lighting with regards to plant growth?**
Traditionally, fluorescent lighting was used for seedlings, cuttings and plants with low light-level requirements and HID was used for established plants and plants with higher light-level requirements. Advances in fluorescent lighting technology, however, have provided more options for horticulturists. T5 fluorescent lighting is the latest in plant growth lighting. T5's high-light output combined with its low heat and energy consumption makes it an ideal light source to grow a broader array of plants.

5) **What are the benefits of using T5 fluorescent lighting for plant growth?**
T5 lamps provide the ideal spectrum for plant growth. Photosynthesis rates peak at 435 nm and 680 nm. A 6500K T5 lamp has a spectral distribution with relative intensity peaks at 435 nm and 615 nm. This equates to very little wasted light energy in terms of plant growth. T5 lamps promote incredible health and vigor of seedlings and cuttings. Root development is superior relative to other lighting sources. While T5 lighting is excellent for starting seeds and cuttings, it's also able to produce enough light for full term growth. Because of their minimal heat output, T5 lamps can be placed 6" -8" above the plant canopy which maximizes photosynthetic response. Unlike conventional fluorescents, plants grown under T5 lamps do not have to be rotated to the center of the lamp. T5's slim diameter enables better photo-optic control of the emitted light, increasing efficiency in the form of even light distribution.

Environmental Impacts of T5 (at a glance):

- T5 lamps have a diameter of 5/8" – smaller is better when it comes to manufacturing, transportation and disposal.
- Reduction in raw materials and components needed for manufacturing.
- Reduction in lamp and fixture packaging materials due to relative size.
- T5 are constructed of 40% less glass than T8.
- T5 contain 30% less phosphor than T8.
- T5 contain 3mg of mercury. 70% less than T8.
- Longer lamp life means reduced maintenance cost and less going to the landfill.

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6) **What are the major differences between HID ballasts and electronic ballasts?**
Frequency output to the lamp and energy conversion from electricity to usable light are the biggest differences between HID ballasts and electronic ballasts. HID ballasts produce a frequency of 60 Hz. Electronic ballasts vary from manufacturer to manufacturer, but the frequency produced can be 400x that of an HID ballast. HID ballasts produce more heat than electronic ballasts, thus making electronic ballasts more energy efficient. You will not, however, save money on your electric bill by using electronic ballasts. HID lighting has been available for 60+ years, while electronic ballast (especially 400 watt and higher) is a relatively new technology.

7) **Are electronic ballasts more energy efficient?**
Electronic ballasts are more efficient at converting electricity into usable light. Since your power bill is based on kilowatt-hours and not efficiency, a 1000 watt electronic ballast will cost you about the same as a 1000 watt HID ballast to operate.

8) **How much energy will my light use?**
An average lighting system will increase your electricity cost about $8 to $20 per month. The exact amount depends on the wattage of the system and the number of hours operated. To calculate your cost, multiply the bulb wattage X the number of hours of operation and divide by 1000. This figure is the number of kilowatt-hours of electricity used. (Example: a 400 watt lamp running for 18 hours will use 7.2 kilowatt-hours). Check your power bill for the cost of each kilowatt-hour. Then multiply the number of kilowatt-hours used by the cost of a kilowatt-hour (K/hr) to figure the cost to run your light for that many hours.

9) **Do I need special wiring in my house for my lighting system?**
Lighting systems are available in a variety of voltages. The standard used by most gardeners is 120 volts / 60 Hz which plugs into a standard wall outlet. Other voltages may require special circuits and receptacles. Always contact a licensed electrician if the light you purchased has special voltage requirements and never exceed more than 75% of the rated ability of the fuse/breaker. (For example: use no more than 15 amps on a 20-amp circuit.)

10) **What voltages are available for HID and Fluorescent lights?**
HID systems are available in 120 volt, 208 volt, 240 volt, 277 volt and 480 volt - All at 60 Hz. Fluorescent lighting varies, but most are available from 100 volt to 277 volt and 50 Hz or 60 Hz.

11) **Will I save on my electric bill if I run my system with 240 volts?**
No. Electric companies base your electrical bill on Wattage, not Voltage or Current. While ballasts wired for 240 volt will draw less current and run a little cooler than one wired for 120 volt, it will not save you money on your electric bill.

12) **How often do I need to change my light bulb?**
Most lamp manufacturers rate their lamps by "Average Life Hours" and usually claim 10,000 to 24,000 hours. These ratings are based on when the lamp will completely fail to come on. They do not factor in loss of intensity or loss of color. HID lamps lose intensity and color through normal use. This is OK if you are lighting a warehouse, but when it comes to plant growth, these losses can mean wasted electricity and poor plant performance. Serious horticulturalists recommend that you replace your lamps after 6000 hours of use. This equates to using your light 16 hours a day for one year.

13) **How long should I run my lights?**
This depends on the type of plants and whether you have natural sunlight available to your garden. As a general rule, when you are in a vegetative stage of plant growth and you have no natural sunlight, run your lights 14-18 hours a day. If you have natural sunlight, it will vary because the sunlight may or may not be direct. It will take a little experimenting to find the best length of time to run your lights. If you are actively fruiting and flowering, the rule is to run your lights 12 hours a day if you have no natural light.

14) **How high do I need to hang my lights above my plants?**
The higher the wattage the further away you want the light to be from your plants due to the amount of heat. HID lighting will be further away than a fluorescent fixture because of this. When mounting your lighting fixture take into account the type of plant and how tall the plant will grow. You want to keep the light as close as you can, but not so close to burn the plant. A simple rule is "if it is comfortable for the back of your hand, it will be a safe distance for your plants". Doing a little research on the type of plant and where it comes from will help in determining how much (or little) light your plants like. With fast growing plants, you may need to check the hanging height on a regular basis as plants that get too close to the lamp will be severely burned.

15) **How big of an area will my light cover?**
The size of the garden area will determine the wattage you need. If we assume that the plants will get no sunlight, a 1000 watt light will cover about 7 x 7 feet of growing area. A 600 watt will cover 6 x 6 feet, a 400 watt will cover 4 x 4 feet, and a 250 watt will cover 3 x 3 feet. These sized areas would be considered the "Primary Growing" areas. These lights will light-up larger areas, but plants placed outside of the Primary Growing area, will stretch and bend toward the light; a phenomenon called phototropism. Keep these areas of coverage in mind when using multiple fixtures. The best results occur when the areas of coverage overlap.

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16) **Why do I need glass to get the UL Listing on a Metal Halide light?**
The inner arc tube of a Metal Halide lamp contains mercury. Underwriters Laboratory has stated that for a Metal Halide fixture to maintain its UL Listing, that an additional tempered safety lens is required in the event that the arc-tube and outer glass fail. This will prevent the spread of Mercury.

17) **Can I run a 1000 watt bulb in my 400 watt lighting system?**
No! The internal components of the ballast are designed to send the correct voltage and current for the rated lamp. Mixing lamps and ballasts will result in premature failure and will void the manufacturers' warranty. Consider the size area you want your garden to be prior to making a lighting purchase. It is better to grow into a fixture than out of one.

18) **Can I run a 430 watt bulb in a 400 watt lighting system?**
Yes, the internal components of 400 watt and 430 watt ballasts are almost identical. You will only get 400 watts of light out of the 430 watt lamp, however.

19) **Do I need to wear gloves when handling an HID light bulb?**
Manufacturers do not state that gloves are required when handling their lamps. It is recommended that your hands be thoroughly washed prior to handling HID lamps though.

20) **What is a conversion bulb?**
A lamp that operates on the opposite ballast it was originally designed for. For example, a 940 watt conversion lamp is an HPS lamp that runs on a 1000 watt Metal Halide Ballast. There are also MH lamps that are designed to operate on HPS ballasts. These bulbs allow the grower to purchase the ballast of their choice and offer the flexibility of growing a variety of plant types by simply changing the lamp they need.

Sun System® lighting fixture questions:

1) **Which Sun System® Reflectors have built-in socket assemblies?**
- Super Sun® 2
- Cool Sun XL
- Sun Tube ™ 6" & 8"
- Yield Master™ 4" & 6"
- Light Pipe™ 6" & 8" (socket only, no lamp cord)
- Cool Sun
- Cool Breeze™ 6", 8" & Magnum
- Econocool
- LumenMax® 2
- Econowing

2) **Which Sun System® Reflectors accept BT-56 bulbs?**
- Cool Sun
- Cool Sun XL
- Sun Gro

3) **Does a BT-56 lamp perform better than a BT-37?**
No! BT-56 was the standard for many years. The reduced jacketed BT-37 will provide the same intensity and color that a BT-56 lamp provides. BT-37 is a physically smaller lamp and is easier to ship and handle.

4) **Is the socket assembly sold separate for Sun System® ballasts?**
Yes

5) **What does MVP™ stand for?**
MVP™ stands for Multi-Volt Powercord. This is Sunlight Supply's exclusive detachable power cord feature. Simply plug the 120 volt power cord into the ballast and it will run on 120 volts. Want 240 volts, plug in a 240 volt power cord (sold separately) into the ballast and it will run on 240 volts. This feature is available on the Sun System® 1, Sun System® 6, Sun System® 7 and Gro Pro™ ballast.

6) **Will the MVP™ power cord work on the Future-Brite™, Infinity™ or Galaxy™ ballasts?**
No. The Future-Brite™ electronic ballast is hard wired for either 120 volt or 240 volt. The Galaxy™ and Infinity™ electronic ballasts use the Smart Volt™ detachable power cord.

7) **How do I clean the inside of my Sun System® Reflector?**
Warm water and mild dish soap are the best to clean and maintain the highly reflective finish. Avoid bleach, ammonia and other harsh or abrasive cleaners.