VividGro LED LIGHTING SOLUTIONS

Optimized growth spectrum
Industry leading PAR output
HighBay 6-panel

Optimized growth spectrum
Industry leading PAR efficiency

Industry leading PAR output
Light is essential for plant growth. While natural sunlight is the best source for plant growth, it isn’t always available for indoor horticulture. Electric light can be used as a single source or as a supplement to increase plant quality and quantity in greenhouse settings. LED lighting is a proven light source that provides longevity, optimal spectral control, photosynthetic efficiency and rapid return on investment with reduced total cost of ownership. It’s also the most earth-friendly solution for you and your plants.
Environmentally-friendly LED GROW LIGHTING

Our LED lighting improves the quality and quantity of your harvest.

All plants, including those flowering, fruiting, and vegetable plants, are strongly influenced by the particular spectrum of light they receive. Farmers have relied on sunlight for years to deliver the perfect recipe, however today's lighting technology can provide what plants need most without help from mother nature.

Today, electric light from HID sources such as metal halide and high pressure sodium plays a significant role in the horticultural industry. It enables growers to expose plants to longer hours of light per day in order to influence the growth cycle. Farmers and gardeners using horticulture lighting as a supplement to sunlight in greenhouses are less reliant on unpredictable factors such as sunlight availability and weather patterns. Electric lighting technology can be used as the sole source of light within grow facilities, however the HID sources commonly used have been electrically inefficient and spectrally insufficient.

LED lighting can significantly increase crop production efficiency through lighting control. LED grow lighting systems are well-suited to provide the most appropriate light for each phase of growth and type of plant, from seedling to flowering to fruiting. LED lighting provides optimal levels of Photosynthetically Active Radiation (PAR)—the photons that promote growth and yield without wasting energy to produce photons not efficiently used by the plant. The optimum spectrum for plants includes wavelengths of light in the blue and red region of the spectrum. Although some grow applications easily accommodate this spectrum, commercial growers will also benefit from the most noticeable benefits of our LED—true “white light” working environment for employees.
Our LED grow lighting solution is well-suited to provide the most appropriate light for each phase of growth and type of plant, from seedling to flowering to fruiting.

**Our LED Grow Lighting Offers:**

- **Optimized Spectrum**
  Provides light only in the PAR region which is suitable for supporting each phase of growth and type of plant.

- **Light Intensity**
  Increased Photosynthetically Active Radiation (PAR) needed to support growth, development, and yield.

- **Heat Management**
  Reduced heat and HVAC requirements reduces the amount of watering needed and increases the overall energy savings for greater crop yield per watt consumed.

- **Energy Savings**
  LED lighting saves up to 40% compared to traditional sources such as High Pressure Sodium (HPS), Metal Halide and fluorescents.

- **Optical Flexibility**
  Optical options such as aisle, medium or wide are available to suit most application requirements.

- **Long Life**
  LEDs last an average of 50,000 hours while reducing energy costs and maintenance costs due to frequently changing rapidly degrading traditional lamps.

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**Keys to PLANT GROWTH SUCCESS**

These are the main properties of light that make the plant grow well and flower or fruit.

**Light Intensity Increases Plant Growth**

The growth of a plant is strongly determined by the total number of photons that it absorbs in the Photosynthetically Active Radiation (PAR) region. In certain parts of the world, seasonally, or in plant production facilities, an adequate amount of PAR is necessary to maximize growth, flowering and fruiting.

**Spectrum To Promote Growth and Yield**

The focus on specific colors of the light spectrum strongly influences the growth and development of the plant. Producing light in the Photosynthetically Active Radiation (PAR) spectrum allows for the most efficiency without wasting energy not used in photosynthesis. Targeting the blue and red portions of the PAR region maximize light absorption efficiency resulting in increased growth, flowering and yield.

**Light Uniformity for Consistent Crop Yield**

When using electric lighting, uniformity of the light spectrum is very important for constant quality of crop production. Consistent and maximum crop yields are accomplished when lighting is provided in the most uniform way. Optics in our LED solutions provide an easy and flexible way to achieve uniform light distribution to your crop.

**Day Length Determines Fruiting Cycle**

With many plants, the time of flowering is influenced by the photoperiod or length of day. For example, a chrysanthemum plant will only bloom when the day is shorter and night is long. We call them “short day” plants. However when you apply a long day photoperiod to them, the flowering will be suppressed. The opposite is true for plants considered to be “long day” plants.
VividGro LED luminaires
GIVE YOU A GROWING ADVANTAGE.

- LED source saves >40% in total energy usage
- Durable aluminum housing for industrial applications
- Wet-location rated for indoor watering and misting
- White-light working environment increases visual comfort

Grow from seedling to flowering to fruiting with the same light source.

Provides Maximum Light
VividGro provides maximum light intensity with increased Photosynthetically Active Radiation (PAR) needed to support growth, development, and yield. Contains more blue in the spectrum compared to HPS to support sturdy plants and compact growth.

Environmentally Friendly
VividGro is long lasting and fully recyclable. The luminaire is RoHS compliant (mercury and lead-free).

Control Your Growing Season

More Light
Adds more daytime light, boosting existing light levels and increasing growth and yield.

Longer Light
Extends the growth cycle. Switch on at dusk for non-daylight illumination. Utilize all winter long.

Controlled Light
Substitute as a complete lighting solution for indoor grow rooms and biological research facilities.
Lighting for Fruits and Vegetables

Food growers are benefiting from the same LED lighting features for flowering plants. With flowering plants, it enables growth to be timed to meet market demands. Indoor urban farms, vertical farms and hobbyists can all save time, energy and money and achieve fresh harvested crops all year long.

Superior Thermal Management
Experience reduced cooling and energy costs when using VividGro LED grow lighting. The luminaire runs 40% cooler than HID lighting.

Reduces Energy and Maintenance
Reduce energy usage and increase your savings with VividGro. Approximately 40% less energy is required to produce an equivalent amount of PAR compared to HPS.

Control Your Spectral Range
Not all light is created equal. VividGro LED-optimized horticulture lighting provides the optimal spectral output to promote photosynthesis. Our proprietary LED sources provide significantly more red and blue PAR per watt than the competition.

Broad Spectrum
Perfect for display plants working and living environments.

Blue and Red
Most photosynthetically efficient for greenhouse supplementation.

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Designed to Meet the Needs of MANY APPLICATIONS

**Urban Farming** – leafy vegetables and soft fruits in vertical arrangements.

**Floriculture** – cut flowers, potted plants, bedding plants and perennials.

**Olericulture** – high wire vegetables, leafy vegetables, herbs and fruits.

**Hydroculture** – soilless medium, or aquatic-based environments.

**Propagation** – tissue culture and seedlings, cuttings and young plants.

**AgroTech** – plant product for use in pharma, technology and experimental research facilities.

**Indoor Hobby Gardening** – horticulture in residential settings.

**Green Walls** – system to improve aesthetics and air quality in indoor environments.
Les Serres Rosaire Pion & Fils, Inc
Les Serres Rosaire Pion & Fils Inc. is currently testing the VividGro fixture compared to a standard HPS system. The test involves Sweet Basil in 4 inch pots. For the first two weeks, there was no difference between HPS and the LED. Beginning the third week, the plants started growing faster under the LED. After 4 weeks, the LED test plant's leaves were wider and much greener. The canopy was denser and measured fuller. Both lighting systems were maintained at the same distance from the surface of the pot. The light intensity, light quality, and light uniformity provided by LED are reasons for the improved growth.

University of Guelph
VividGro LED grow lighting is currently undergoing trials at the University of Guelph, Controlled Environment Systems Research Facility in Ontario, Canada. The luminaire is being utilized for applications in photobiological studies with applications in space travel and support. The Controlled Environment Systems Research Facility and its Space and Advanced Life Support Agriculture program are an essential part of Canada's contributions to plant research and development for space and closed environment related activities.

Atlanta Botanical Garden
The Atlanta Botanical Garden needed to upgrade their existing HPS lamps used to maintain tropical and rare plants in their Fuqua Conservatory. They turned to Lighting Science for an LED solution that would be long lasting, more efficient, and use less energy. They chose the VividGro Highbay fixture to install in their greenhouse and have reported excellent growth of their precious germplasm under the state-of-the-art LED grow fixture.

NASA, International Space Advanced Plant Habitat
Plant growth will be an important part of space exploration in the future as NASA plans for long-duration missions in space. NASA scientists anticipate that astronauts may be able to grow plants in space, and the plants could be used to supplement meals. Kennedy Space Center chose VividGro luminaires for prototype and development testing in the design of the ISS Plant Growth Chamber Experiment (Advanced Plant Habitat). The research team was looking for a highly efficient, spectrally optimized LED grow light fixture to support their plant growth studies. They have asked Lighting Science to provide a custom variation of the VividGro highbay fixture to use in these studies.
PRODUCT SPECIFICATIONS

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<tr>
<th></th>
<th>Broad Spectrum</th>
<th>Blue &amp; Red Spectrum</th>
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<tbody>
<tr>
<td>PAR Output</td>
<td>636 µmol/s</td>
<td>663 µmol/s</td>
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<tr>
<td>Input Wattage</td>
<td>390W</td>
<td>390W</td>
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<tr>
<td>PAR Efficacy (µmol/J)</td>
<td>1.63 µmol/J delivered</td>
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<td>% Blue</td>
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<td>17%</td>
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<tr>
<td>Rated Life L70</td>
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<tr>
<td>Housing</td>
<td>Low Copper Cast Aluminum</td>
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<tr>
<td>Optical Distribution</td>
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<tr>
<td>Mounting Options</td>
<td>Pendant, Eyebolt &amp; Cord</td>
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<tr>
<td>Standard Finish</td>
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<tr>
<td>Dimensions</td>
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<td>Weight</td>
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<td>Voltage</td>
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<td>Operating Temperature</td>
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<td>Power Factor (PF)</td>
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<td>Certifications</td>
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**BENEFITS**

- Up to 70% more delivered µmol PAR/J than HPS.
- 40% less energy required to produce an equivalent amount of PAR compared to HPS
- High PAR output and increased photosynthetic efficiency
- Spectrum tailored to maximize photosynthetic absorption efficiency
- Spectrum suitable for germination, vegetative growth and flowering/fruiting
- No radiated heat to allow for maximum irradiance at close proximity to plant canopy.
- Low-profile modern design. Compact size for small spaces and unobtrusive aesthetics.
- Passive cooling, no fans, moving parts or noise

1 All values nominal, based on aisle optic photometric analysis. Reference Utah State paper at http://cpl.usu.edu/files/publications/factsheet/pub__6441190.pdf
PRODUCT ORDERING INFORMATION \ EXAMPLE: VGROHB 390W P6 M MVOLT CLR PND WH

<table>
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<th>Product</th>
<th>Wattage</th>
<th>Color Temp.</th>
<th>Optical Panel</th>
<th>Optical Distribution</th>
<th>Voltage</th>
<th>Lens</th>
<th>Mounting</th>
<th>Finish</th>
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<tr>
<td>VGROHB VividGro Highbay</td>
<td>390W</td>
<td>Leave blank for Broad Spectrum</td>
<td>P6 Panel 6</td>
<td>Aisle</td>
<td>MVOLT</td>
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<td>WH</td>
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<td></td>
<td>Multi-Volt 120-277 VAC @ 50-60Hz</td>
<td>Clear lens</td>
<td>Pendant Mount</td>
<td>White</td>
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<tr>
<td></td>
<td>P</td>
<td>(Blue &amp; Red)</td>
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<td>Medium</td>
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<tr>
<td></td>
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BROAD SPECTRAL DISTRIBUTION

BLUE & RED SPECTRAL DISTRIBUTION

OPTICAL DISTRIBUTION

DIMENSIONS

VIVIDGRO LED LIGHTING SOLUTIONS

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We unleash the science of light to make people look, feel and heal better.