



LED Solutions

For Plant Growth
In Controlled
Environments

LEDs in Plant Growth Research

More and more, plant scientists are integrating LEDs into their research programs to meet their needs for a specific light spectrum and to reduce the operational cost of their controlled growth environments. Integrating best of breed technologies, Conviron offers preconfigured LED lighting options and we work extensively with clients to develop customized solutions to suit specific research requirements.

Matching Light Spectrum to Research Objectives

LEDs are becoming increasingly important in plant science research in controlled environments because they enable a researcher to prescribe a specific light spectrum to stimulate responses in plants. With multiple suppliers of LED technology available, researchers can select from a variety of solutions to best suit their research objectives, considering factors such as:

- **Light Source** - LEDs can serve as a primary source of light, or to supplement other light sources with blue or red/far-red wavelengths.
- **Spectrum** - narrow band or continuous wide spectrum LEDs can be used to deliver a unique light spectrum to plants.
- **Adjustability** - fixed spectrum LEDs can be used in combinations of fixtures to create a blended spectrum within a controlled environment. Variable spectrum LED systems allow the researcher to control spectral composition by adjusting the intensity of individual LED color channels within the fixture.
- **Intensity** - LEDs retain their spectral profiles when dimmed, providing consistency in spectrum as researchers adjust intensities throughout the light cycle.
- **Environment** - unlike fluorescent bulbs, LED output remains vastly more stable as chamber temperature decreases, providing consistency in spectrum for a wide range of temperatures.

Reducing Energy Consumption

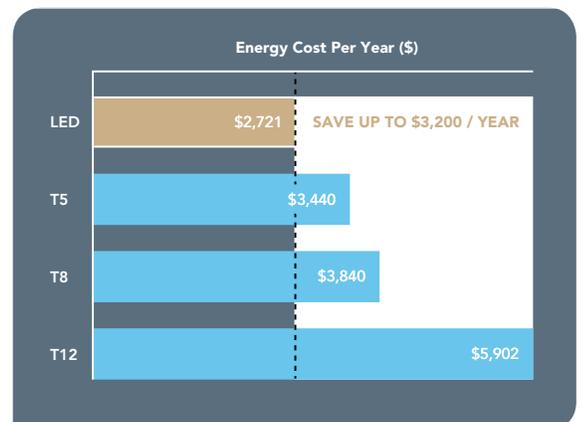
LEDs are an energy efficient light source for plant research in controlled environments. LEDs direct all their light toward the plant without the reflectors required by other light sources that emit radially. While LEDs emit significantly more light per unit of input energy than fluorescent bulbs, they also produce less radiant heat, and can therefore be placed closer to plant material. With less waste heat, the cooling requirement for the controlled environment is diminished and the total energy used by an LED-equipped chamber is substantially reduced.



A1000 Chamber with Valoya NS1 LED fixtures



A1000 Chamber with Valoya LED fixtures



Real Savings: Based on operating a simple 16-hour lights on/8-hour lights off cycle, and average energy costs of \$0.15 per kWh, a 2000 liter growth chamber configured with a canopy featuring Valoya AP673 LEDs will save \$700 per year compared to the same model with T5 fluorescent lighting, and almost \$3,200 per year compared to T12 lighting



Multi-tier Walk-in Room with Philips LED fixtures



Conviron Growth House™ with Illumitex LED fixtures

Custom LED Solutions

Regardless of the size of a growth chamber or style of a room, Conviron will work with clients to design an LED lighting system that meets the spectrum requirements and fits the configuration of the controlled environment.

As a primary distributor for Valoya Oy of Finland, we offer continuous wide spectrum LEDs that have been developed specifically for plant growth. We also collaborate closely with clients and other LED manufacturers to assist in the selection of the appropriate LED technology to provide the required light spectrum. We then adapt existing canopies – or design new ones – to deliver the intensity and uniformity intended by the researcher for plant growth. Finally, we customize the controller and cooling system to provide the controlled environment that suits the researchers' unique requirements.

LED Options on New Chambers

For many clients seeking a new chamber, an LED solution already exists. Conviron offers light canopies with Valoya LEDs as a standard option on several chamber models. We have also provided LED systems on walk-in rooms like the multi-tier MTPS and the Conviron Growth House™.

Retrofits & Upgrades to Existing Chambers

Chambers and rooms manufactured by Conviron or other suppliers can be retrofitted with a custom-designed LED lighting system. Our approach to designing a retrofit considers:

- **Research Objectives** - depending on the research and the variety of plants, certain LED technologies will be better suited to deliver the desired spectrum.
- **Chamber Design** - the physical mounting of LED fixtures and their drivers, as well the cooling system requirements must be considered to ensure intended performance over time.
- **Controller Integration** - to control light spectrum and intensity, an LED solution must integrate smoothly with the control system. Conviron has tested its controllers with several LED technologies to ensure seamless integration and control over features such as photoperiod, spectrum and lighting output.

For your LED solution, contact info@conviron.com



About Conviron

Established in 1964, Conviron is the world's leading supplier of controlled environment systems for plant science and agricultural biotechnology research. From small reach-in chambers to full-scale growth houses, and custom solutions – Conviron systems can be found in small start-up facilities to many of the world's largest and most prestigious research institutions in over 90 countries.

Conviron's global sales, distribution and service network offers a comprehensive suite of value-added services that encompass the entire life-cycle of your project – from early-stage design through to installation, project commissioning, ongoing maintenance, support and technology upgrades.

When it comes to LED lighting, Conviron continues to lead the industry with innovative solutions. Contact one of our company representatives for assistance in determining the LED option that is most appropriate for your controlled environment needs.



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Conviron - Head Office

Winnipeg, Manitoba, Canada
Toll Free: 1 800 363 6451

Conviron - US

Pembina, North Dakota, USA
Toll Free: 1 800 363 6451

Conviron Europe Ltd.

Isleham, Cambridgeshire, UK
Tel: +44 1638 741112

Conviron Germany GmbH

Berlin, Germany
Tel: +49 (0) 30 367 00660

Conviron - China

Shanghai, China
Tel: +86 21 62147582

Conviron - Australia

Melbourne, Australia
Toll Free: 1300 438 912

www.conviron.com

info@conviron.com



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