GLASE: Greenhouse Lighting and Systems Engineering

A public-private consortium with research activities at Cornell University, Rensselaer Polytechnic Institute (RPI), and Rutgers University

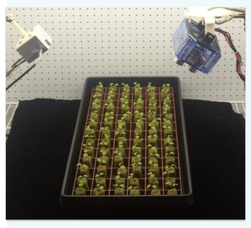
Background: The technologies underlying horticultural lighting and control systems are rapidly evolving. They provide new tools with value-added applications in Controlled Environment Agriculture (CEA) facilities both in academia and the private industry. The improved capabilities offered by new integrated lighting systems can optimize energy use efficiency and increase crop production in greenhouses.

Who We Are: The Greenhouse Lighting and Systems Engineering (**GLASE**) consortium is a partnership with scientists at Cornell University and the LESA center at RPI. GLASE is pursuing breakthrough research activities to improve horticultural lighting systems and controls. Working with the industry leaders GLASE is closing the gaps between the different segments of the CEA supply chain to meet the industry needs.

Our Mission: Advance the CEA field through a holistic approach bringing together different areas of expertise from academia and marketplace creating a hub for technology and information exchange among the industry stakeholders and key players. **Our Goal:** Develop, transfer and implement new energy-efficient technologies to reduce energy use for a more sustainable and profitable greenhouse industry.

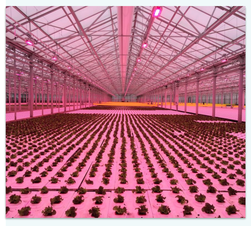
Energy Efficacy and Radiometry

Improved horticultural lights are tested for efficacy, spectral output, and Photosynthetic Active Radiation (PAR) distribution. The data are implemented in new greenhouse lighting systems.



Plant Sensing

At LESA, a sensor for plant growth was developed based on Chlorophyll A fluorescence. The sensor aids crop monitoring due to non-invasive and automated recordings in real time.

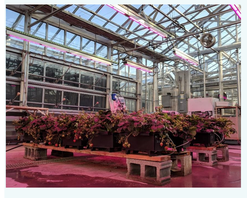


Pilots

GLASE-developed technology is implemented in commercial greenhouses in NY to demonstrate its benefits and incentivize energy efficient technology adoption by the broad CEA industry.

Horticultural LED fixtures

Research LED fixtures designed with 6 wavelengths to examine how the spectrum and timing of light impacts the growth rate and nutritional quality of greenhouse crops.

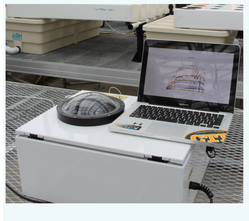


Light and Shade System Implementation

Control algorithm to forecast the total solar day light integral (DLI) for a day, and then operate supplemental lights and movable shades to provide the crops a consistent DLI every day.

Technology Transfer

GLASE works with industry members to bring new technologies to market. The GLASE industry partners have exclusive access to newly developed technologies and research findings.

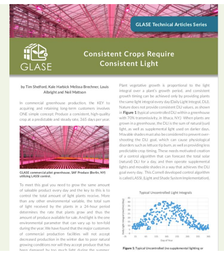


Spectrum/Irradiance Optimization

The Spectral Acquisition Sensor System, SASSy, records ambient light spectrum variation. The data will be used for real-time adjustment to a stable spectral ratio at crop canopy.

Carbon Dioxide Enrichment Studies

The DLI is optimized with the CO_2 concentration for optimum light use efficiency and crop development. The data is used to improve the lighting control algorithm (called LASSI).



Knowledge Transfer

GLASE provides a series of outreach and educational activities (webinars, industry talks, technical bulletins, and newsletters) to condition the industry and foster technology implementation.

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