LumiGrow, Inc. 2018 Station Report
NCERA-101: Committee on Controlled Environment Technology & Use

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LumiGrow LED horticultural lighting solutions provide growers with the ability to save energy while improving plant performance. LumiGrow continues to support CEA growers by providing solutions that target their lighting needs and address their concerns. By partnering with academic researchers and commercial growers LumiGrow supports research that transfers new findings to growers and directs researchers toward practical applications with lighting. Our in-house research focusing on variable spectrum, DLI and photoperiod to demonstrate how optimizing light can reduce energy consumption and increase production.

Personnel

- Brian Poel joined LumiGrow, April 2017 as a Horticultural Lighting Specialist to coordinate and oversee grower trials and facilitate technology transfer from internal and university research.

New Equipment and Facilities

- In January 2017, LumiGrow launched the Pro Series E fixture, with 15% more light output than our prior Pro Series. The Pro Series E carries an energy efficiency of 1.9 umol/joule, which translates into a 50% energy savings over 400W magnetic ballast HPS fixture, or a 12% savings over a double ended HPS fixture with electronic ballast.
- In Fall 2017, LumiGrow released our integrated light sensor technology, named the *smartPAR Light Sensor Module.* This sensor was demonstrated at our booth at NCERA-101, Monterey, 2017. The light sensor is being tested at several commercial production facilities as well as LumiGrow directed work at:
    - Harrow Research and Development Centre in Harrow, ON in four identical greenhouse chambers covering 70 m^2 each.
    - Cabrillo College in Aptos, CA to in a standard lettuce production hoop house.
- To validate the LumiGrow sensor we are using Apogee SQ-520 quantum sensors as a reference to log light intensity data at multiple locations under each treatment at our commercial trial locations.
- At each site, we have developed an energy monitoring and logging system to compare energy usage between supplemental lighting control systems

Accomplishment Summaries

- Experiments investigating the effect of photoperiod while maintaining identical daily light integral on the vegetative growth of leafy greens, and vegetable seedlings. In general, in the growth chamber environment a 21-h photoperiod resulted in increased growth and coloration when economically significant.
- Beta-testing of light sensor-mediated daily light integral control was implemented at multiple commercial partners to compare lighting control against current greenhouse control methods and expand user interface with specific grower use scenarios.
- Completed first full year of a multi-phase production study comparing production of high-wire indeterminate greenhouse cucumbers under supplemental lighting from HPS lamps and LED overhead lighting. After two harvest cycles, production is greater under LED supplemental lighting through increased DLI resulting from flexibility of lighting delivery, specifically because total energy load is lower and there is greater ability to control intensity via software.

Impact Statements

- In the greenhouse, we demonstrated that the same DLI over a 21-h photoperiod compared to a 12-h results in greater fresh weight, increased coloration and reduced tip burn in two varieties of red-leaf lettuce.
- Providing supplemental lighting at 100 $\mu mol \cdot m^{-2} \cdot s^{-1}$ resulted in a more profitable production system compared to 200 $\mu mol \cdot m^{-2} \cdot s^{-1}$ or no supplemental lighting for winter production of hydroponic greenhouse strawberries in the Great Lakes region.

Published Written Works and Presentations

Holley, J., R. Schuster, and M. Yelton. 2017. Longer photoperiods with consistent daily light integral produces greater growth in tomatoes and lettuce. 2017 ASHS Annual Conference (oral abstract).

Nishimura, S., K. Harbick, R. Schuster, J. Hubert, J. Holley, N.S. Mattson, and M. Yelton. 2017. Creating lighting in the greenhouse. 2017 ASHS Annual Conference (oral abstract).

Poel, B.R. and E.S. Runkle. 2017. Supplemental greenhouse lighting to produce seedlings: LED or HPS? Greenhouse Grower 35(9).