Fluence Bioengineering 2018 Station Report
NCERA-101: Committee on Controlled Environment Technology & Use

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New Equipment and Facilities

Fluence's Austin, TX photobiology lab consists of eight climate-controlled walk-in growth chambers. Environmental variables for each chamber are controlled using a Hortimax-Go control system. Temperature and relative humidity are monitored with EE181-L air temperature/relative humidity sensors and recorded with a Campbell Scientific CR1000 data logger. The lab is undergoing some improvements including the installation of a dosatron injection system.

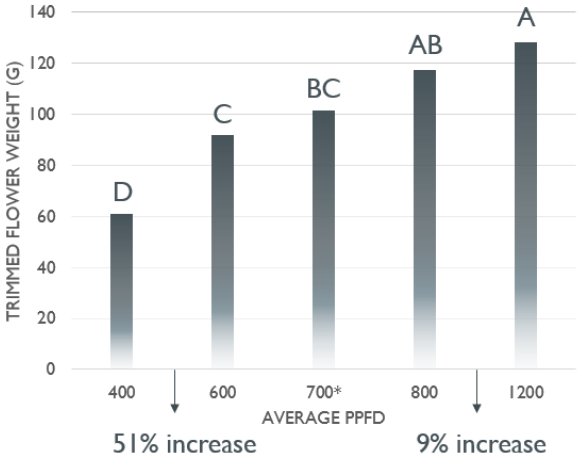
Fluence will be a collaborative partner to a second photobiology lab which will focus primarily on *Cannabis*. This is currently being constructed in Salinas, CA.

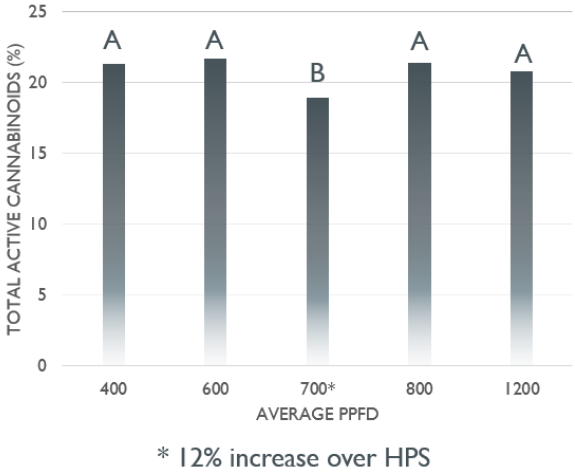
Unique Plant Responses

Fluence performs internal research and collaborates with partners from academia and the controlled environment agriculture (CEA) industry. The primary focus of our research is to

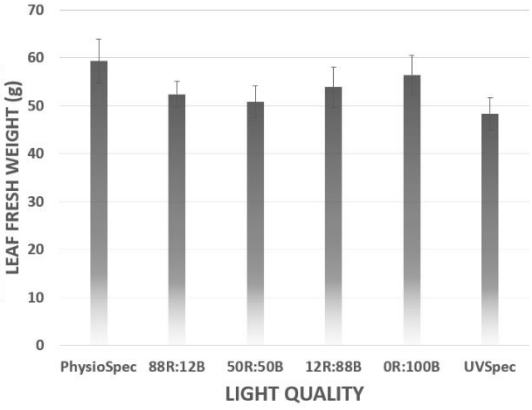
determine the influence of light intensity and spectral light quality on growth, development, and secondary metabolite concentrations of multiple plant species. Additionally, we examine energy efficiency and other environmental variables to identify combined methods that produce the highest yielding and highest quality crops for the commercial horticulture industry. We have found the following unique plant responses this past year:

- **Light intensity influenced yield and secondary metabolite concentration of *Cannabis sativa*.**
- Trials are in collaboration with OutCo – San Diego, CA

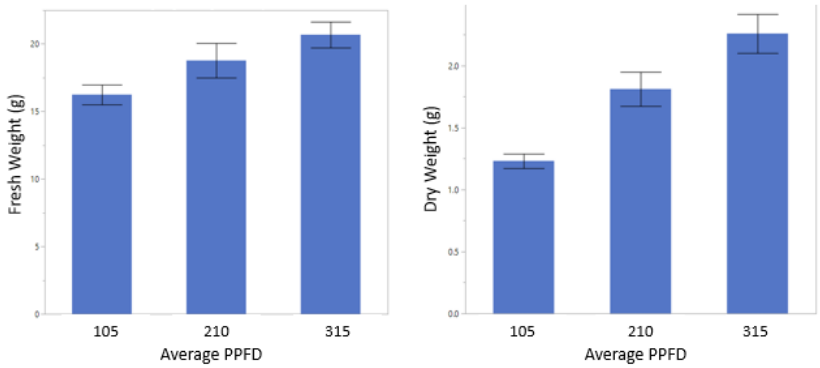




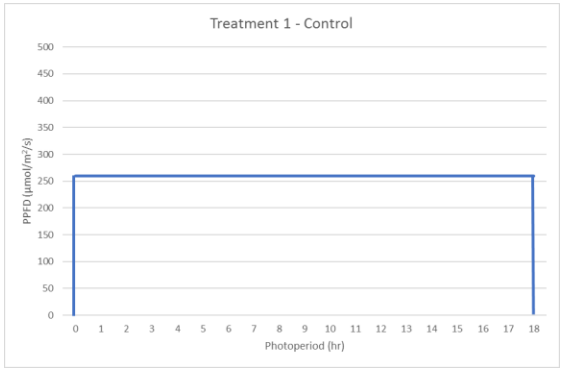
- **End-of-production light quality influenced yield, morphology, and secondary metabolite concentration of Ocimum *basilicum*.**
- Trials in collaboration with Shenandoah Growers

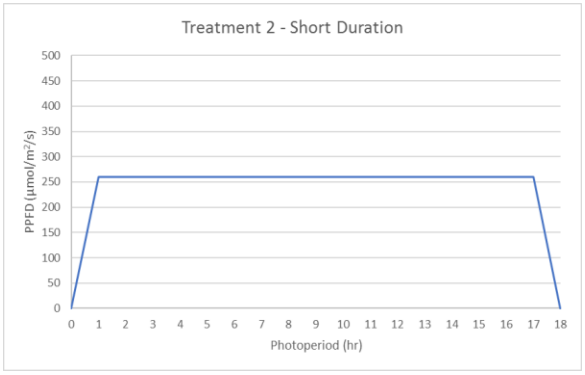


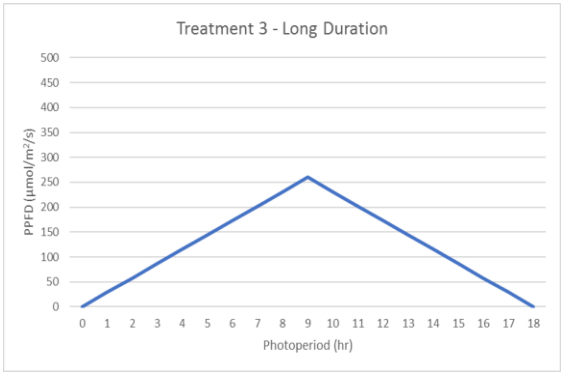
- **Light intensity influenced yield and morphology of *Eruca sativa***

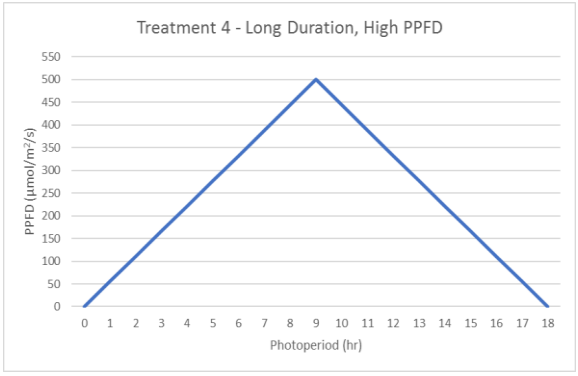


- **Influence of dimming control on yield and morphology of *Latuca sativa var. capitate***
- Data Pending.









Left to Right: Photos from Treatment 1 – 4 from Red Cross and Rex varieties

- **Influence of end-of-production light quality on yield and secondary metabolite concentration of *Cannabis sativa.***
- Trials in collaboration with MedMen
- Data Pending

Control | 400 nm | 420 nm | 450 nm | 50:50% 450 + 660 nm

- **Influence of end-of-production light quality on yield and anthocyanin concentration of *Cannabis sativa.***
- Trials in collaboration with MedMen
- Data Pending

Control | 50:50% 450 + 660 nm | 88:12% 450 + 660 nm

Accomplishment Summary

The lighting research being performed internally and collaboratively with academic research partners is providing stakeholders in the controlled environment agriculture industry with information to optimize crop productivity and energy efficiency

Impact Statement

Fluence Bioengineering LED-based lighting systems are designed to provide high levels of photosynthetically active radiation (PAR) ideal for commercial cultivation and research applications. From sole-source lighting to supplemental greenhouse lighting, Fluence custom tailors their light spectrum and form-factors to optimize plant growth and increase yields while consuming less energy and reducing operating costs versus legacy technologies.

Published Written Works

- Gerovac, J.R. 2017. How to Optimize the Strength of Hydroponic Nutrient Solutions. Maximum Yield.
- Gerovac, J.R. 2017. Supplemental Greenhouse Lighting: Evaluating Innovative Technologies. Greenhouse Product News.
- Gerovac, J.R. 2017. Understand Energy Efficiency of Horticulture Lighting Systems. LEDs Magazine.
- Gerovac, J.R. 2017. Why Humans use Lumens and Plants use Par. Maximum Yield.

Website

- https://fluence.science