

NCERA-101: Committee on Controlled Environment Technology and Use
2008 Station Report
Department of Bioresource Engineering, McGill University
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Impact Nugget

We have reported that the influence of wavelength of light can influence nutritional quality of vegetable plant production, which could impact grower's ability to grow and market supplemental lighting of crops.

Unique Plant Responses

Our group published a paper on the impact of LED wavelength influencing carotenoid pigment accumulation (lutein and β -carotene) within kale plants.

Accomplishment Summaries

The Macdonald Campus of McGill University is developing further into controlled environments with work on the impact LED lighting system and impact on post harvest handling. Our previous research in collaboration with the University of Tennessee used a lighting system that produced wavelength of 730, 640, 525, 440, and 400 nm. Maximum accumulation, on a fresh mass basis, of chlorophyll a and b and lutein occurred at the wavelength of 640 nm, whereas b-carotene accumulation peaked under the 440-nm treatment. Management of irradiance and wavelength may hold promise to maximize nutritional potential of vegetable crops grown in controlled environments.

Impact statement

LED lighting at McGill University have been trying to quantified the impact that wavelength has on different vegetable and fruit crops. As a result these plants could result in increased yield, production rates and as a long term potential of increased nutritional quality. For a region such as Quebec with a large greenhouse industry this could result in a new marketing opportunity for this region. The added benefit of this research is decreases in energy usage and improved light uniformity within the controlled environment system

Published Works

Lefsrud, M.G., D.A. Kopsell, C.E. Sams. 2008. Wavelengths from Adjustable Light-emitting Diodes affect Secondary Metabolites in Kale. *HortScience* 43(7):2243-2244

Lefsrud, M.G., D.A. Kopsell, J. Wills Jr., C. Sams, and A.J. Both. 2008. Dry Matter Content and Stability of Carotenoids in Kale and Spinach During Drying. *HortScience* 43(6):1731-1736.

Oral Presentations

Effect of Wavelength on Carotenoid Accumulation in Kale, July 14, 2008. Plant and Soils Montreal, Quebec.