DLC Horticultural Lighting Resources:

Horticultural Lighting & Ultraviolet Radiation

Ultraviolet radiation and its place in horticultural lighting

Ultraviolet radiation (UV) is an intended output for many horticultural lighting fixtures. There are several reported benefits to using UV radiation, including the potential to aid in plant development and the mitigation of pathogen spread. Unfortunately, it can be difficult to accurately measure the total radiant flux in the ultraviolet range using commercially available equipment.

Measurement approaches and tools depend on reliable reflection of photons within the test equipment. Because UV wavelengths have higher absorption rates among commonly-used test equipment, this skews measurements and introduces uncertainty. The figure below depicts the potential inaccuracies and where they might occur.

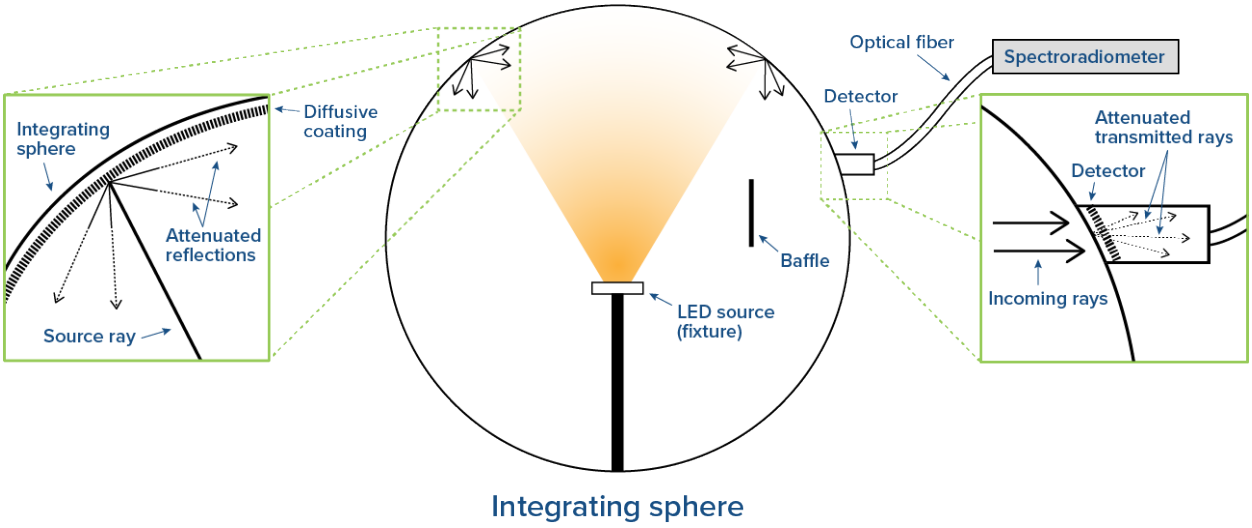

Figure 1: attenuated photon reflections at UV wavelengths

LED device-level testing *is* possible with more sophisticated and costly equipment, and the data from these tests is used by manufacturers of UV-emitting LEDs to characterize their products to customers. The DLC does not currently require reporting on UV performance for fixture qualification, but is monitoring the technical readiness and scale-up of testing procedures to entire fixtures that is underway within the industry. When consensus is reached on the broad utility of UV wavelengths in horticultural lighting products and the testing capabilities are available to reliably report on performance, the

DLC will consider including requirements for reporting performance characteristics on its Horticultural Lighting QPL.

What can I do now?

Even considering the concerns mentioned above, there are methods available to estimate applied UV flux. While they are not the high-accuracy integrated product performance measurements that the DLC needs for qualification and listing, these estimates may produce useful information for any users interested in applying UV wavelengths to their facility.

If a fixture is installed at a specific distance above the task plane, and a spectroradiometer specifically calibrated for UV sensing is used to collect a plane of measured points of flux in the UV region, a user can plot an application-level intensity map. This map will be more accurate if multiple fixtures are installed in a representative layout, and the intensity map will only be valid for the specific models and layout tested. The DLC also recommends that appropriate safety practices always be followed when working with UV-emitting products, and defers to equipment manufacturers and safety organizations as the most knowledgeable parties for how to work with a specific product.

Would you like to know more?

This document is intended to introduce concepts at a basic level. For more detailed information, please refer to the standards and/or research bodies listed below:

- The American Society of Agricultural and Biological Engineers (ASABE)
- Greenhouse Lighting and Systems Engineering (GLASE)
- The Illuminating Engineering Society (IES)
- Lighting Enabled Systems & Applications (LESA)
- The Lighting Research Center (LRC)
- The Resource Innovation Institute (RII)

Each of these entities has been instrumental in the development of the DLC horticultural lighting requirements, and the DLC looks forward to continued cooperation with all in maximizing the horticultural sector's energy efficiency and productivity.