Antifungal action of 405 nm light emitting diodes on tomatoes in a meso-scale system and their effect on the physicochemical properties

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Abstract

This study evaluated, at a meso-scale, the antifungal effect of 405 nm LED illumination against *Botrytis cinerea* and *Rhizopus stolonifer* on tomatoes, as well as its effect of on the physicochemical properties. Tomatoes were surface-inoculated with *B. cinerea* and *R. stolonifer*, and illuminated with 87 W/m^2 for twelve days. Subsequently, the antifungal effect, defined as the difference in mold populations on the control and illuminated samples, was observed to be 1.9 log CFU/g for *B. cinerea* and 3.2 log CFU/g for *R. stolonifer*. In terms of physicochemical effects, beginning from day 9, the total phenolic content, TEAC and vitamin C content of illuminated samples was significantly higher ($P > 0.05$) by 24.6%, 28.2% and 16.5%, respectively, compared to control, but a greater reduction in mass and lycopene content was also observed. Overall, these results suggest the potential of 405 nm LEDs for controlling mold growth on tomatoes during transportation and storage, retaining their physicochemical quality.