Post-raccolta

Applications of LED lighting during post-harvest for improved quality of tomatoes

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Tomato production has increased in recent years due to the economic and nutritional importance of the crop. However, post-harvest losses are a major challenge that hampers tomato production in most developing countries. Tomato is a climacteric fruit that can ripen after harvest, resulting in changes in its final nutritional composition and shelf life. Light emitting diode (LED) systems have emerged as an efficient artificial lighting technique recently used by researchers in postharvest storage of fruits and vegetables. Light can influence postharvest physicochemical parameters and thus the formation of bioactive compounds in tomatoes. The objective of this study was to investigate the influence of different LED postharvest wavelengths and photoperiods on tomato physicochemical parameters during storage. Hydroponically-grown tomatoes (*Solanum lycopersicum* L. cv. 'Siranzo') at "turning stage" were harvested and immediately stored in a climate controlled opaque chamber at 13ºC, where they were exposed to different LED treatments. The first experiment examined the overall effect of continuous irradiation with different monochromatic colours (red, blue, far-red, white, and green) for 21 days, while the second experiment focused on the effects of intermittent red illumination (24 h, 12 h, 6 h, 3 h, 2 h, and 1 h per day) for 18 days. In both experiments, a control treatment where tomatoes were stored in darkness was included. The results showed the potential of LED treatments to prolong and improve the quality parameters of tomato. Blue light proved to be an effective application to delay fruit ripening, while red and far red promoted higher induction of lycopene synthesis during storage. In addition, short irradiation time showed the potential to control senescence and maintain high nutritional quality. The use of LED lighting during storage or transportation could be an alternative solution to reduce postharvest losses and maintain product quality and shelf life. Further research should focus on optimising lighting parameters at different stages of tomato development.

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Keywords: *Solanum lycopersicum*, post-harvest, Light Emitting Diode, shelf life, physicochemical parameters.