

# Far-red light during cultivation induces postharvest cold tolerance in tomato fruit

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## Abstract

We investigated the role of far-red LED light during cultivation on postharvest cold tolerance in tomato fruit (*Solanum lycopersicum* cv MoneyMaker). Red and blue top LED light, providing  $150 \mu\text{mol m}^{-2} \text{s}^{-1}$  photo-synthetically active radiation (PAR) at plant height for 16 h daily, was combined with 0, 30 or  $50 \mu\text{mol m}^{-2} \text{s}^{-1}$  (non-PAR) far-red LED light. Tomatoes were harvested at the mature green or red stage and subjected to cold storage for 0, 5, 10, and 15 d at 4 °C, followed by 20 d shelf-life at 20 °C.

Mature green harvested tomatoes, cultivated with additional far-red light, showed reduced weight loss, less pitting, faster red colour development during shelf-life (when prior long cold stored), and less softening (when prior short or non-cold stored). FR lighting during cultivation likely protects the membrane integrity of MG tomatoes and thus allows uninterrupted lycopene synthesis. Red harvested tomatoes cultivated with additional far-red light were firmer at harvest, showed reduced weight loss and less decay during shelf-life. Less red colouration was observed for red harvested fruits at the start of shelf-life when fruits were prior cold stored, indicative of lycopene breakdown during cold storage. The improved cold tolerance of red harvested fruits grown under additional far-red light is likely due to higher firmness at the start of the shelf-life period with lycopene acting as antioxidant during cold storage. In conclusion, additional far-red light during cultivation improved postharvest cold tolerance for tomatoes harvested at both the green and red maturity stage, and might therefore be suitable to prolong the storage potential of tomato at sub-optimal temperatures.