

# Effect of postharvest irradiation with red light on epidermal color and carotenoid concentration in different parts of tomatoes

Lachinee Panjai, Simone Röhlen-Schmittgen, Jan Ellenberger, Georg Noga, Mauricio Hunsche and Antje Fiebig

Journal of Food Measurement and Characterization 15: 1737–1746. 2021.

---

## Abstract

The aim of this study was to investigate the effect of red light irradiation during postharvest ripening with focus on the outer (epicarp and mesocarp) and inner (endocarp and seed) parts of tomatoes by evaluating concomitant alterations in bioactive compounds, such as lycopene,  $\beta$ -carotene, total phenolic and total flavonoid concentrations, external fruit color and spectral reflectance pattern, and the Simple Chlorophyll Fluorescence ratio. As promising measure, deriving from previous studies, green stage-1 tomatoes were harvested and treated daily with red light for 12 h per day, for 15 days (followed by storage in darkness for additional 6 days) or continuously radiated with red light for 21 days. Control untreated tomatoes were kept in the dark for the same period. Application of continuous red light strongly accelerated changes in the outer layer of fruit, for example visible in color parameters. Significant differences between treatments were analyzed for major secondary metabolite compounds such as lycopene,  $\beta$ -carotene, total phenolic and total flavonoid in both outer and inner fruit layers. Continuous red light treatment led to the highest concentration of secondary metabolite compounds in all parameters. Therefore, it can be concluded that continuous red light radiation is the most effective treatment to accelerate the color development and ripening of the outer layer of the epicarp. Furthermore, it plays a role in stimulating the inner layer of the endocarp to provide beneficial secondary metabolite compounds.