

Application of melatonin for the control of food-borne *Bacillus* species in cherry tomatoes

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Abstract

Food-borne *Bacillus* species are often associated with postharvest fruit and vegetables, and are a common cause of food poisoning. In this work, melatonin was found to inhibit the growth of food-borne *Bacillus* species, including *B. cereus*, *B. licheniformis* and *B. subtilis*, on cherry tomatoes. This result was attributed to two complementary effects. On one side, melatonin showed antibacterial activity to *B. subtilis*, inhibiting cell division and oxidative phosphorylation, and reducing swimming motility and biofilm formation. On the other side, melatonin enhanced the antioxidant capacity of cherry tomatoes, and induced the biosynthesis of phenolics and ethylene, and the overexpression of pathogenesis-related genes *PT16* and *PR1b1*. The defence response was only observed in the presence of both *B. subtilis* and melatonin, but not in the single treatments. Although melatonin was known to induce disease resistance in fruit in the presence of necrotrophic pathogens, this is the first report of melatonin inducing fruit defence after treatment with a non-necrotrophic bacterium. Collectively, the application of melatonin for the control of food-borne *Bacillus* pathogens was explored for the first time, revealing a new potential application of melatonin in postharvest products.