

Melatonin priming retards fungal decay in postharvest table grapes

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Abstract (250 words)

Postharvest losses of fruits may reach in some cases 40% in developed countries. This food waste has a significant carbon footprint and makes a major contribution toward greenhouse gas emissions so sustainable postharvest strategies are being investigated.

Melatonin, a well-known mammalian neurohormone, has been investigated as a priming agent to slow down fungal decay progression in postharvest climacteric and some non-climacteric fruits. However, the molecular and metabolic mechanisms responsible for such enhancement of disease tolerance are largely unknown. This work aimed to evaluate the effects of melatonin priming in fungal decay progression in postharvest table grapes (*Vitis vinifera* L. cv. 'Red Globe' and 'Sugra 48'). Melatonin-treated grapes clearly presented lower levels of fungal decay incidence and symptom severity. DNA sequencing putatively identified three fungal species in postharvest grapes: *Penicillium expansum*, *Penicillium crustosum* and *Cladosporium cladosporioides*. While MDA and total anthocyanin content presented no altered levels due to melatonin treatment, phytoalexins' profile significantly changed (e.g. *trans*-resveratrol, *trans*-piceid). Recent untargeted metabolomics data suggests that phenylpropanoid pathway is being remodelled under melatonin treatment (e.g. gallic acid, catechin gallate, specific anthocyanins). RNA extraction and sequencing is being conducted to integrate these metabolic results with molecular data. Altogether, results indicate that melatonin priming leads to an effective response to fungal decay in table grapes by modulating secondary metabolism involved in defense. Ultimately, this work will clarify mechanistic processes regarding this innovative priming agent that may also have a positive impact on nutritional quality of fruits.

Keywords: melatonin priming, postharvest, table grapes, fungal decay, fruit quality.