

Title UV-C treatment affects the expression and activity of defense genes in strawberry fruit (*Fragaria × ananassa*, Duch.)

Author Marina A. Pombo, Hernán G. Rosli, Gustavo A. Martínez and Pedro M. Civello

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Abstract

UV-C treatment is a new and environment-friendly strategy to reduce postharvest decay in several fruits. In this work, we studied the induction of resistance to *Botrytis cinerea* in strawberry fruit, exposed to a hormetic dose of UV-C. The results obtained showed that pre-storage treatment of fruit with UV-C results in lower losses caused by diseases and decay. Therefore, we analyzed the gene expression and enzymatic activity of a set of strawberry genes that are related to plant defense against pathogens. The expression of the genes and the activity of assayed enzymes were modified in the treated fruit. The expression and enzyme activity of phenylalanine ammonia lyase (PAL, EC: 4.3.1.24) increased over the level found in control after 4 and 24 h of storage. The activity of β -1,3-glucanase (EC: 3.2.1.6) and peroxidase (EC: 1.11.1.7) showed a biphasic pattern. Higher polyphenol oxidase (PPO, EC: 1.10.3.1) activity was observed in treated fruit compared with control from 10 to 48 h post-irradiation. Moreover, we studied the expression of several strawberry PR proteins. We found an induction of *FaChi2-2* and *FaChi3* immediately after the treatment, and the corresponding chitinase (EC: 3.2.1.14) activity increased 10 h post-treatment. Gene expression profile of β -1,3-glucanases was different from those of chitinases. *FaBG2-1* mRNA levels increased in the treated fruit during the beginning of storage, but in the case of *FaBG2-3*, irradiated fruit showed higher expression than the control after 24 and 48 h of storage. Finally, *FaPR1* gene expression was stimulated by UV-C treatment at 4 and 24 h of storage. No changes in *FaOLP2* expression in fruit were found in response to irradiation. Therefore, the reduction in strawberry fruit decay by UV-C treatment at harvest could be related to the increase in the transcription and activity of a set of enzymes and proteins involved in the defense against pathogens.