

Title Natural and safe alternatives to conventional methods to control gray mold of table grapes in storage

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Abstract

Gray mold, caused by *Botrytis cinerea*, is the main postharvest decay of table grapes. It can develop in the vineyard and spread rapidly among berries after harvest, during long distant transport, cold storage and shelf life. Harvested bunches are usually stored in the presence of sulfur dioxide. However, the use of synthetic fungicides and of sulfur dioxide is not allowed on organic grapes and the study of alternative means to control postharvest decay has developed during several decades, along with the expansion of organic agriculture. We can group these approaches as follows: i) biocontrol agents; ii) natural antimicrobials; iii) GRAS type decontaminating agents; and iv) physical means. Two biocontrol agents, *Muscodor albus* and *Hanseniaspora uvarum*, have shown equal or better effectiveness than conventional means to control gray mold of table grapes in laboratory scale experiments. Currently, the bottleneck regarding the commercial use of biocontrol agents is that the registration process is comparable to that of fungicides, with similar costs but often with a narrower market. Natural antimicrobials, such as salts, chitosan, and plant extracts, demonstrated good results and often were applied in semi-practical or practical conditions. Several GRAS-classified sanitizers were tested to extend postharvest storage of table grapes, including acetic acid, electrolyzed oxidizing water, ozone, and ethanol, although the GRAS status of some of these compounds is dose-dependent or questionable. Physical means in reference to variations in temperature, radiation, pressure or changing atmospheric composition are all postharvest practices which require significant adaptation by the industry which is accustomed to minimal intervention during harvest. Overall, the use of ozone and of calcium chloride are two successful examples moved to practical application. Improved understanding of the various methodologies and their mode of action will lead to further optimization of the treatments and to generation of novel combinations to control postharvest decay of table grapes. The possible requirements that alternative means should have for the application in the table grape fields and/or packinghouses were summarized.