

## Abstract

Gray mold (*Botrytis cinerea*) is the principal cause of decay on strawberry. Pesticides are often used to control decay; however, for strawberry, postharvest fungicides are not available. With increasing consumer concern and the loss of registration of many pesticides, alternatives are necessary to provide decay control. The efficacy of several combination treatments of heat, biological control, and controlled atmospheres (CA) was evaluated for decay control on strawberry. High oxygen atmospheres were tested as a substitute for traditional CA. Although 100 kPa O<sub>2</sub> was slightly more effective than 15 kPa CO<sub>2</sub> in reducing decay, increased fermentative metabolite production upon return to air makes this a doubtful alternative. Therefore, 15 kPa CO<sub>2</sub> was used in subsequent studies. The effects of heat on *B. cinerea*, biocontrols, and fruit were also evaluated. *Botrytis cinerea* germination was hindered with hot water treatments of 45 and 50°C. A hot water treatment of 45°C for 15 min provided decay control and partially sanitized the fruit. Moreover, high temperature hot water dips were effective in reducing decay, while maintaining strawberry quality. Fruit sustained less damage with the 63°C water dip for 12 s; hence, this treatment was used in additional studies. *Pichia guilliermondii* was the most thermotolerant biocontrol, while *Aureobasidium pullulans* was the most sensitive, and *Candida oleophila* was intermediate. These three yeasts were also tested for their effective control, without causing fruit damage. As this yeast grows at a wide range of temperatures and is more effective when applied prior to pathogen inoculation, it is a good candidate for field application. CaCl<sub>2</sub> treatment did not significantly increase the decay control achieved with *P. guilliermondii* and resulted in some fruit deterioration. While the combination of all three alternatives, hot water immersion followed by biocontrol application, and CA storage, showed better decay control than single or double treatments at early evaluation times, this difference was not maintained throughout storage. Overall, the benefits of the combinations do not justify the added cost necessary to implement these treatments for strawberry.