

# Influence of sulfur dioxide-emitting polyethylene packaging on blueberry decay and quality during extended storage

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## Abstract

Blueberries are highly susceptible to decay after harvest and application of sulfur dioxide (SO<sub>2</sub>) has been shown to effectively control decay during extended storage. Box liners are commonly used with other commodities to reduce water loss. In 2017 three varieties, 'Emerald', 'Jewel' and 'Misty', were obtained from commercial packing houses. They were contained in plastic clamshells with 12 clamshells per box. We examined: 1) two liners that continuously emitted SO<sub>2</sub> from sodium metabisulfite incorporated into the liner film. These were ventilated with holes that comprised 0.3 % or 0.9 % of the liner surface area; 2) two solid, non-ventilated liners designed to develop a modified atmosphere (MA) during storage, either alone or with SO<sub>2</sub> emitting sheets inside the packages within the liners; 3) control packages without liners. After packaging the fruit were placed into storage for either 3 or 6 weeks and then evaluated for decay and fruit quality. The effect on decay was determined both by assessing natural decay and by determining the spread of decay from berries inoculated with *Botrytis cinerea*. In 2018 two varieties, 'Draper' and 'Duke' were tested in a similar manner, except a 0.1 % vented liner replaced the 0.9 % liner, which performed poorly in 2017, and the SO<sub>2</sub>-emitting sheets were not included as a treatment. In 2018 we measured concentrations of SO<sub>2</sub> and atmospheric gases were monitored within the packages. Results from both years indicated that the SO<sub>2</sub>-emitting liners were effective in reducing natural decay and the spread of aerial mycelial growth of *B. cinerea* from inoculated berries compared to treatments without SO<sub>2</sub>. Treatments that combined SO<sub>2</sub> and MA (SO<sub>2</sub>/MA) were the most effective. MA alone did not consistently control decay. The high level of effectiveness of the SO<sub>2</sub>/MA treatment in controlling decay may be due to higher humidity levels within the packages that would enhance SO<sub>2</sub> activity, because SO<sub>2</sub> concentrations did not differ among the liner types and concentrations of CO<sub>2</sub> in the MA packaging were too low to have had much effect.

Weight loss was significantly less in packaging with liners with less vent area, with the least being in the MA packaging, regardless of the presence of SO<sub>2</sub>. Less weight loss was associated with reduced shrivel, although firmness was not always greater. SO<sub>2</sub> concentrations measured in 2018 did not exceed 10 µL L<sup>-1</sup> and bleaching of the berries did not occur in either year. SO<sub>2</sub>-emitting liners are an effective means of preserving blueberry quality during extended storage, particularly when combined with MA. The simplicity of assembling a package with a single liner versus using a conventional liner followed by a SO<sub>2</sub>-emitting sheet could be of benefit to blueberry packers.