

**Title** Control of blue mold of apple by combining controlled atmosphere, an antagonist mixture, and sodium bicarbonate

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### **Abstract**

'Golden Delicious' apples were wound-inoculated with *Penicillium expansum* and treated with various combinations of sodium bicarbonate and two antagonists (*Metschnikowia pulcherrima*, *Cryptococcus laurentii*), and then stored in air or controlled atmosphere (CA = 1.4 kPa O<sub>2</sub> and 3 kPa CO<sub>2</sub>) for 2 or 4 months at 1 °C. The antagonists survived and their populations increased during both air and CA storage. The antagonists alone reduced blue mold but were more effective when combined. Sodium bicarbonate tended to reduce lesion size when used with these antagonist, either when they were used alone or combined. Storage under CA conditions also increased the effectiveness of both antagonist, when used alone or in combination. The only treatment that completely eliminated *P. expansum*-incited decay was the combination of the two antagonists and sodium bicarbonate on fruit stored under CA conditions. The proper combination of alternative control measures can provide commercially acceptable long-term control of fruit decay and could help reduce our dependency on fungicides.