

**Title** Restorative biological control - a promising new approach, but can we prove it?  
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#### **Abstract**

A new approach to biological control is to enhance the populations of biocontrol organisms already present on the surface of the crop to be protected by the use of benign interventions. Several compounds reported in the literature to promote growth of microorganisms were screened for efficacy against *Colletotrichum acutatum*, the cause of bitter rot of apples, on detached fruit. Calcium chloride inhibited lesion diameter on inoculated apples, and when applied in combination with three biocontrol active yeast isolates (*Aureobasidium pullulans* Y2, *Rhodosporidium diobovatum* Y8 and *Cryptococcus* sp. Y9), the lesion diameter was inhibited more than by either treatment by itself. In field trials for two seasons, calcium chloride controlled bitter rots of apples. In the second season, control of field-expressed disease was as effective as that with a standard fungicide regime. Although control of rots postharvest was still statistically significant ( $P < 0.05$ ) after 16 weeks' coolstorage, calcium chloride was not as effective as the fungicides. A biocontrol agent (*Serratia marcescens* HR42) was also applied inundatively in the second field experiment, and significantly controlled postharvest rots for up to 12 weeks' storage but not after 16 weeks. The identification and comparison of microorganisms isolated from washed fruit from the different treatments failed to demonstrate any differences associated with those treatments that controlled rots. Apple fruit skin is being examined microscopically to determine if the calcium promoted visible changes in the surface and cell wall structures. At this stage in our research, it is not clear if calcium chloride applied in the field is controlling bitter rot by enhancing biocontrol organisms or by some other means.