

Title Improved control of anthracnose rot in loquat fruit by a combination treatment of *Pichia membranifaciens* with CaCl₂

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Abstract

The beneficial effect of 2% CaCl₂ (w/v) on the antagonistic yeast *Pichia membranifaciens* for control of anthracnose rot caused by *Colletotrichum acutatum* in postharvest loquat fruit (*Eriobotrya japonica* L.) and the possible mechanisms involved were investigated. The results showed that treatment with *P. membranifaciens* at 1×10^8 CFU ml⁻¹ or 2% CaCl₂ alone both resulted in significantly smaller lesion diameter and lower disease incidence of anthracnose rot on loquat fruit wounds compared with the controls. The biocontrol activity of *P. membranifaciens* on the disease was enhanced by the addition of 2% CaCl₂, the combined treatment of *P. membranifaciens* with CaCl₂ resulted in a remarkably improved control of the disease in comparison with the treatment of *P. membranifaciens* or CaCl₂ alone. *P. membranifaciens* in combination with CaCl₂ induced higher activities of two defense-related enzymes chitinase and β -1,3-glucanase in loquat fruit than applying the yeast or CaCl₂ alone. The *in vitro* experiment showed that the addition of 2% CaCl₂ in the suspensions of *P. membranifaciens* significantly inhibited spore germination and germ tube elongation of *C. acutatum* than the yeast or CaCl₂ alone. However, adding CaCl₂ did not significantly influence the population of *P. membranifaciens* in NYDB medium or fruit wounds. These results suggest that CaCl₂ could improve the biocontrol activity of *P. membranifaciens* on anthracnose rot in loquat fruit. It is postulated that the improved control of the disease is directly because of the higher inhibitory effect on pathogen growth and indirectly because of the enhanced disease resistance in loquat fruit by the combination treatment.