

Title Combination of antagonistic yeasts with two food additives for control of brown rot caused by *Monilinia fructicola* on sweet cherry fruit

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Abstract

Aims:To evaluate beneficial effect of two food additives, ammonium molybdate ($\text{NH}_4\text{-Mo}$) and sodium bicarbonate (NaBi), on antagonistic yeasts for control of brown rot caused by *Monilinia fructicola* in sweet cherry fruit under various storage conditions. The mechanisms of action by which food additives enhance the efficacy of antagonistic yeasts were also evaluated. **Methods and Results:**Biocontrol activity of *Pichia membranefaciens* and *Cryptococcus laurentii* against brown rot in sweet cherry fruit was improved by addition of 5 mmol l⁻¹ $\text{NH}_4\text{-Mo}$ or 2% NaBi when stored in air at 20 and 0 degree C, and in controlled atmosphere (CA) storage with 10% O_2 + 10% CO_2 at 0 degree C. Population dynamics of *P. membranefaciens* in the wounds of fruit were inhibited by $\text{NH}_4\text{-Mo}$ at 20 degree C after 1 day of incubation and growth of *C. laurentii* was inhibited by $\text{NH}_4\text{-Mo}$ at 0 degree C in CA storage after 60 days. In contrast, NaBi did not significantly influence growth of the two yeasts in fruit wounds under various storage conditions except that the growth of *P. membranefaciens* was stimulated after storage for 45 days at 0 degree C in CA storage. When used alone, the two additives showed effective control of brown rot in sweet cherry fruit and the efficacy was closely correlated with the concentrations used. The result of in vitro indicated that growth of *M. fructicola* was significantly inhibited by $\text{NH}_4\text{-Mo}$ and NaBi. **Conclusion:**Application of additives improved biocontrol of brown rot on sweet cherry fruit under various storage conditions. It is postulated that the enhancement of disease control is directly because of the inhibitory effects of additives on pathogen growth, and indirectly because of the relatively little influence of additives on the growth of antagonistic yeasts. **Significance and Impact of the Study:**The results obtained in this study suggest that an integration of $\text{NH}_4\text{-Mo}$ or NaBi with biocontrol agents has great potential in commercial management of postharvest diseases of fruit.