Title Improved biocontrol of fruit decay fungi with *Pichia pastoris* recombinant strains expressing Psd1 antifungal peptide

Author W.J. Janisiewicz, I. Bastos Pereira, M.S. Almeida, D.P. Roberts, M. Wisniewski and E. Kurtenbach

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Abstract

Future expansion of biological control of postharvest diseases will depend largely on improving its effectiveness under a broader range of conditions and expanding its activity to new commodities and new diseases. Plasmid pGAPZαC/*Ps*d1, a binary vector encoding the constitutive expression of the gene for the pea defensin *Ps*d1, was used to transform the yeast *Pichia pastoris*, and transformed strains were evaluated for enhancing biocontrol potential by *Ps*d1. Two *P. pastoris* strains, X-33 and GS115, were successfully transformed by electroporation and produced the active r*Ps*d1 peptide. Nontransformed strain X-33 grew faster than strain GS115 in Golden Delicious apple wounds and was chosen as the host for plasmid pGAPZαC/*Ps*d1 in biocontrol tests. The severity and incidence of blue mold decay caused by *Penicillium expansum* were significantly reduced on apples treated with X-33(pGAPZαC/*Ps*d1/X-33) when compared to apples inoculated with this fungus alone or in combination with the nontransformed parental strain X-33, or the X-33(pGAPZαC/X-33) recombinant containing the empty binary vector. Four selected transformants reduced decay in repeated studies, but were effective only when applied at a lower (6.3×10^5 CFU mL^{-1}) cell concentration. This study demonstrates the potential of *Ps*d1 for enhancing suppression of postharvest diseases. However, the full potential of the *Ps*d1 defensin may be achieved after optimizing its expression and activity on the fruit.