

Title Biological control of postharvest spoilage caused by *Penicillium expansum* and *Botrytis cinerea* in apple by using the bacterium *Rahnella aquatilis*

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Abstract

The epiphytic bacterium *Rahnella aquatilis*, isolated from fruit and leaves of apples, was tested for antagonistic properties against *Penicillium expansum* and *Botrytis cinerea* on Red Delicious apple fruit. In “in vitro” assays, this bacterium inhibited completely the germination of *P. expansum* and *B. cinerea* spores, but it needed direct contact with the spores to do it. However the putative mechanism seemed be different for the two pathogens. The bacterium did not produce extracellular antibiotic substances and when the acute toxicity test was performed no mortality, toxicity symptoms or organ alterations of the test animals (Wistar rats) were observed.

Assays of biological control of *P. expansum* and *B. cinerea* on apple fruit were carried out at different temperatures. At 15 °C and 90% RH, the incidence of disease caused by *P. expansum* on apples stored for 20 days, was reduced by nearly 100% by *R. aquatilis* (10^6 cells/ml), while in the case of *B. cinerea*, the reduction of decay severity was nearly 64% but there was no reduction in the incidence of disease. At 4 °C and 90% RH the treatment with the bacterium significantly inhibited the development of *B. cinerea* on apples stored for 40 days and the incidence of disease was reduced by nearly 100%, while the incidence of disease caused by *P. expansum* at 4 °C was 60%. The results obtained show that *R. aquatilis* would be an interesting microorganism to be used as a biocontrol agent.