Title Historical perspective on biological control of postharvest diseases - past, present, and future

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Abstract

The birth of the field of biological control of postharvest diseases can be traced back to 1984 when a researcher testing an antagonist (*Bacillus subtilis*) in the field to control brown rot of peaches (caused by *Monilinia fructicola*) decided to apply the antagonist directly to the peach to control brown rot. The results were striking. It became apparent from this simple experiment that postharvest diseases and biocontrol were meant for each other. The advantages of applying biological control practices in the packinghouse vs. the field became clear. Biological control holds great promise of providing an alternative to present postharvest chemical fungicides for the control of postharvest diseases and reducing the health and environmental hazards presented by synthetic fungicides. Researchers around the world have been pursuing the use of antagonistic yeasts and bacteria as such alternatives and registered products are now on the market. The major shortcoming of these first products has been their lack of an eradicant action. In other words once a postharvest infection occurs the antagonist is unable to arrest it. This has required the addition of low dosages of synthetic fungicides with the antagonist in order to reach levels of disease control comparable to the synthetic fungicide alone. The early concept of postharvest biocontrol as being a one on one relationship between an antagonist and a pathogen limited approaches to the development of this technology. Using an expanded concept, combinations of antagonists with natural fungicides and physical treatments that induce host resistance are yielding more effective control and enhancing the potential of postharvest biocontrol. Advances in the fields of molecular biology and microecology hold promise for a better understanding of postharvest biocontrol systems and expanding the application of postharvest biocontrol strategies. There is the potential of identifying and manipulating “biocontrol genes” in antagonists to produce more effective antagonists. Genes in antagonists responsible for suppression of pathogens have also been used to screen for more effective antagonists. There is evidence that plants can genetically control epiphytes on their surfaces that contribute to biocontrol. This presents the prospect that “biocontrol genes” can be identified in postharvest commodities that will promote suppressive epiphytes and thus reduce the development of postharvest diseases.